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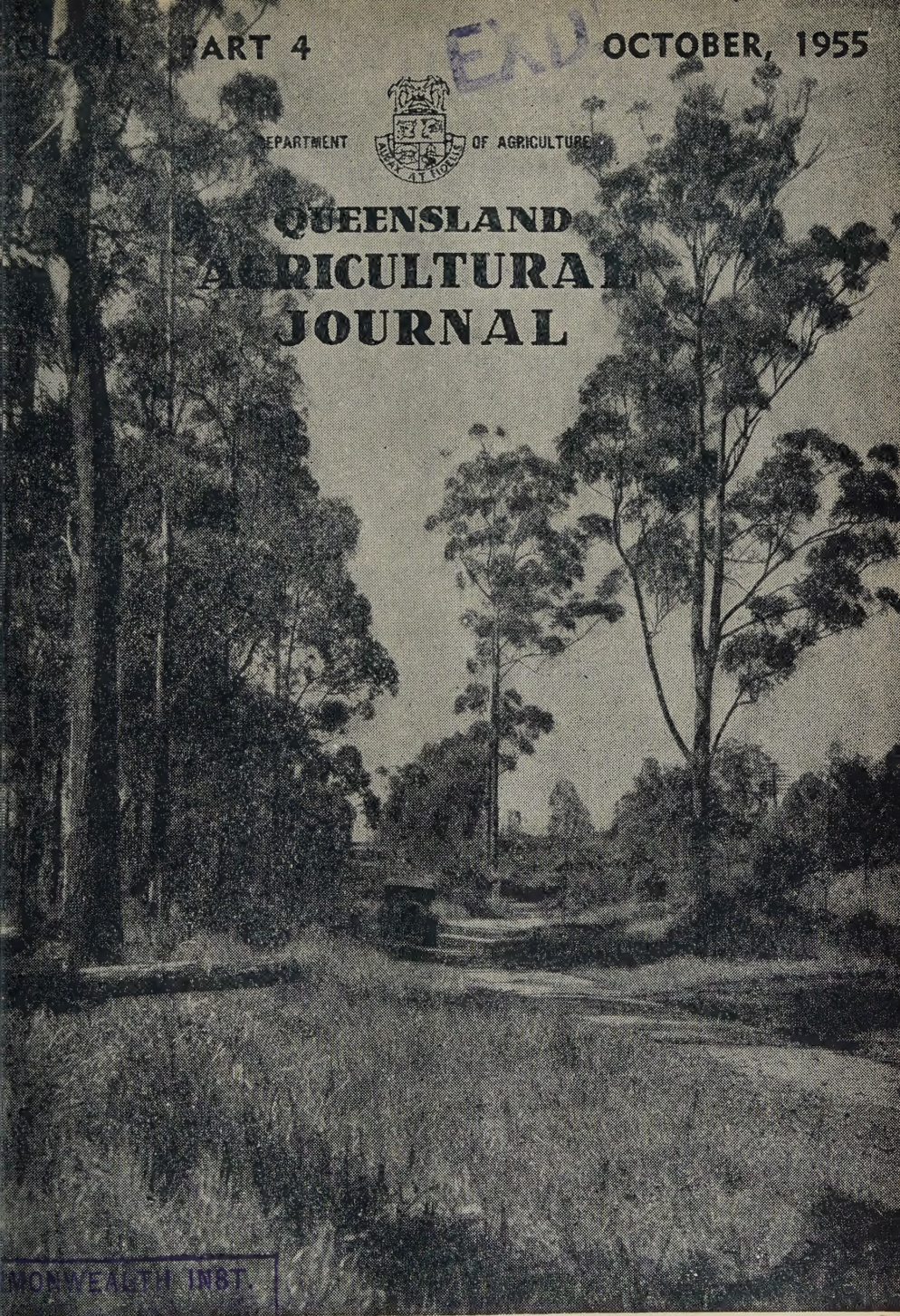

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First Aid for Farm Animals
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(Lists of extension services in Central and North Queensland will appear in the next issue.)

Queensland AGRICULTURAL JOURNAL

Contents

Field Crops—

The Agricultural Potential of the Central Queensland Highlands. By J. Hart. 187

Fruit Growing—

Mulching the Strawberry Crop. By K. M. Ward 203

Vegetable Growing—

Cabbage Varieties in Southern Queensland. By A. R. Carr 206

Beekeeping—

The Honey Flora of South-eastern Queensland. By S. T. Blake and C. Roff 211

Animal Health—

First Aid Treatment of Farm Animals. By W. R. Ramsay 215

Cattle Husbandry—

Aids to Feeding. By P. Round and K. A. Taylor 219

Dairy Farming—

Group Herd Recording Scheme Rules 225

Dairying in Denmark. By L. E. Nichols 231

Poultry Raising—

The Stickfast Flea of Poultry. By B. W. Moffatt 239

Pig Raising—

Breeds of Pigs. By F. Bostock 243

Brucellosis-Tested Swine Herds 248

Tuberculosis-Free Cattle Herds.

TESTED HERDS (As at 22nd September, 1955).

The Tuberculosis-free Herd Scheme (which is distinct from the tuberculosis eradication scheme operating in commercial dairy herds) was initiated by the Department of Agriculture and Stock for the purpose of assisting owners of cattle studs to maintain their herds free from tuberculosis and so create a reservoir of tuberculosis-free cattle from which intending purchasers can draw their requirements. The studs listed here have fulfilled the conditions to the date shown above.

Breed.	Owner's Name and Address.
Aberdeen Angus ..	The Scottish Australian Company Ltd., Texas Station, Texas
A.I.S.	M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
	F. B. Sullivan, "Fermanagh," Pittsworth
	D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
	W. Henschell, "Yarranvale," Yarranlea
	Con. O'Sullivan, "Navillus" Stud, Greenmount
	H. V. Littleton, "Wongalea" Stud, Hillview, Crow's Nest
	J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
	Sullivan Bros., "Valera" Stud, Pittsworth
	Reushle Bros., "Reubydale" Stud, Ravensbourne
	H. F. Marquardt, "Chelmer" Stud, Wondai
	A. C. and C. R. Marquardt, "Cedar Valley," Wondai
	A. H. Sokoll, "Sunny Crest" Stud, Wondai
	W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
	G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
	C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
	W. H. Thompson, "Alfa Vale," Nanango
	S. R. Moore, Sunnyside, West Wooroolin
	H.M. State Farm, Numinbah
	D. G. Neale, "Groveley," Greenmount
	Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
	A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
	W. D. Davis, "Wamba" Stud, Chinchilla
	Queensland Agricultural High School and College, Lawes
	C. K. Roche, Freestone, Warwick
	Mrs K. Henry, Greenmount
	D. B. Green, Deloraine Stud, Durong, Proston
	E. Evans, Wootha, Maleny
	T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
	J. Crookey, "Arolla A.I.S. Stud" Fairview, Allora
	M. F. Power, "Barfield," Kapaldo
	A. H. Webster, "Millievale," Derrymore
	W. H. Sanderson, "Sunlit Farm," Mulgildie
Ayrshire	L. Holmes, "Benbecula," Yarranlea
	J. N. Scott, "Auchen Eden," Camp Mountain
	"St. Christopher's" and "Iona" Studs, Brookfield road, Brisbane
	E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
	C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
	G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
	T. F. Dunn, Alanbank, Gleneagle
Friesian	C. H. Naumann, "Yarrabine" Stud, Yarraman
	D. J. Pender, "Camelot," Lytton road, Lindum
Guernsey	C. D. Holmes, "Springview," Yarraman
	A. B. Fletcher, Cossart Vale, Boonah
	W. H. Doss, Degilbo, *via* Biggenden
	A. C. Swendson, Coolabunia, Box 26, Kingaroy
	C. Scott, "Coralgrae," Din Din road, Nanango
	R. J. Wissemann, "Robnea," Headington Hill, Clifton
	G. L. Johnson, "Old Cannindah," Monto
Jersey	Queensland Agricultural High School and College, Lawes
	J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
	J. F. Lau, "Rosallen" Jersey Stud, Goombungee
	G. Harley, Hopewell, M.S. 189, Kingaroy
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	W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
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	G. & V. Beattie, "Beauvern," Antigua, Maryborough
	J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
	W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
Polled Hereford ..	W. Maller, "Boreview," Pickanjinnie
	J. H. Anderson, "Inverary," Yandilla
	D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
	E. W. G. McCamley, Eulogie Park, Dululu
	Wilson and McDouall, Calliope Station, Calliope

The Agricultural Potential of the Central Queensland Highlands.

By J. HART, Senior Adviser in Agriculture.

Many people are watching the early stages of agricultural extension in the Central Queensland Highlands with interest. In view of the past history of the area there seem perhaps good reasons for a wary approach, for earlier agricultural efforts met with little success.

Lands Department maps dated 1870 show that numerous properties were subdivided into 640-acre blocks for the obvious purpose of farming, yet these blocks were never farmed. Older residents of this area speak with bitterness of the fate of the few who attempted dairying around the turn of the century and of the abortive efforts at cotton growing some years later.

Old rusty ploughs, maize planters and innumerable sets of harness can still be seen on many of the larger stations. Thus, the "wait and see" attitude in some quarters to more recent agricultural activities is somewhat understandable, and it has been those very ploughs, those maize planters, that harness and those 640-acre blocks that have hindered expansion in this locality.

Today the Darling Downs in southern Queensland is probably considered equal to the best farming land in Australia. Yet only 20 years ago much of the Darling Downs allegedly would not grow wheat, and its summer crops, grown only along the eastern fringe, had a decidedly low yield average.

What has brought about the agricultural transformation on the Darling Downs? It is largely the advent of the tractor and modern farming machinery. It is suggested that this also is the answer to the problem of agricultural expansion in Central Queensland. Modern equipment allows efficient tillage and the effective maintenance of a fallow. It also enables large areas to be cultivated, planted or harvested with speed, at a time when conditions are most favourable for the required operation. These advantages, coupled with the use of grain sorghum and suitable varieties of other crops, will lead to the successful development of this area.

THE CENTRAL QUEENSLAND HIGHLANDS.

Detailed descriptions of the chief characteristics of the area have been given in previous issues of the Journal. (See "Some Agricultural Features of the Central Highlands Regions of Queensland" by P. J. Skerman, March-April 1953; and "The Cattle Country of the Central Highlands" by J. J. Sullivan, February 1954.)

However, an interesting picture of the region can be obtained if its features are compared with those of the Darling Downs. The intensive development of the Downs over recent years could well form the pattern of future settlement in the Central Highlands.

Plate 1 shows that while the Darling Downs has the present advantage of being able to supply either southern Queensland or New South Wales

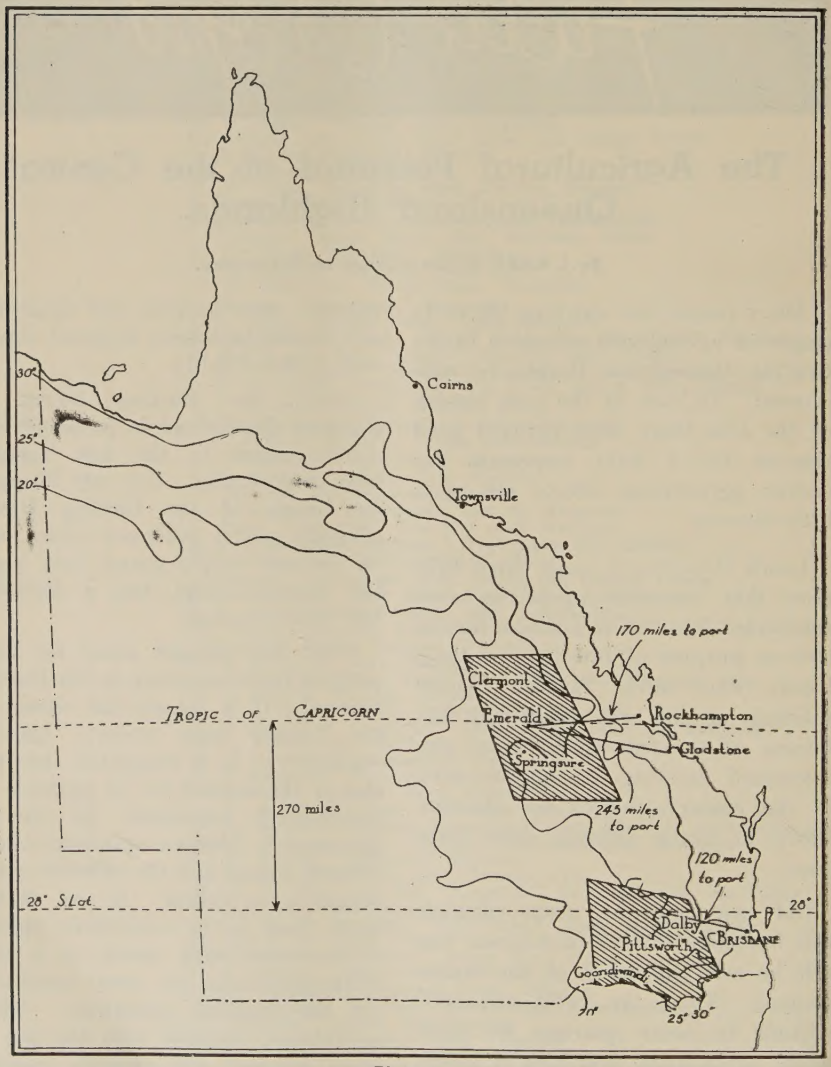

Plate 1.

Sketch Map of Queensland showing the Location of the Central Highlands in Relation to the Darling Downs. The rainfall lines shown are those for 20 in., 25 in and 30 in. average annual rainfall.

markets, the Central Highlands region is in a commanding position to supply the future needs of an expanding central and northern Queensland. The distances from ports are somewhat comparable and both areas lie in the same rainfall belt.

Direct comparisons between areas involved, soil types and climatic conditions can be drawn from the information in Table 1.

The climatological data for the Central Highlands have been obtained by averaging the data from Emerald, Springsure and Clermont. The data for the Darling Downs have similarly been obtained by averaging those from Pittsworth, Dalby and Warwick. This enables a broad but legitimate comparison to be made.

Table 1 suggests some considerable similarity between the two regions. However, many differences do occur and these will be briefly mentioned in the following discussion on the information given in this table.

TABLE 1.

Comparison of Central Queensland Highlands and Darling Downs.

	Central Queensland Highlands.	Darling Downs.
1. Approximate Areas (acres)	24,000,000	24,000,000
2. Main Regional Divisions—		
(*a*) Open downs	2,700,000	2,500,000
(*b*) Open downs potentially arable	1,700,000	2,500,000
(*c*) Brigalow	4,500,000	5,000,000
(*d*) Brigalow potentially arable	3,000,000	4,000,000
3. Rainfall (inches)—		
(*a*) Total	25·9	27·1
(*b*) Distribution—		
January	4·45	3·62
February	3·82	3·09
March	3·03	2·53
April	1·54	1·54
May	1·20	1·33
June	1·70	1·73
July	1·12	1·75
August	0·85	1·17
September	1·08	1·55
October	1·44	2·47
November	2·24	2·72
December	3·46	3·62
4. Temperatures (deg. F.)—		
(*a*) Mean Maximum—		
January	94·0	87·6
July	72·1	63·5
Annual	84·9	77·0
(*b*) Mean Minimum—		
January	70·1	63·4
July	43·4	39·7
Annual	58·0	52·3
(*c*) Mean relative humidity 9 a.m.—		
January	61·0	61·0
July	63·0	71·0
Annual	59·0	63·0
5. Frost—		
Average frost-free period (days)	310	249

Plate 2.

Well Grazed Open Forest Country in the Central Highlands District. This picture was taken on a stock route near Clermont; the cattle had been walked into the district from Valley of Lagoons, for fattening on sorghum residues.

TOPOGRAPHY.

The open downs country of Central Queensland is distinctly undulating. This gives rise to an erosion potential greater than that of the extensive plains of the Darling Downs. In most cases, however, the slopes are less than 5% and on the potentially arable land they rarely exceed 2%. Some modification of standard soil-conservation measures involving the use of strip-cropping as a major feature may be required to counter this erosion potential.

Stretches of open downs are not extensive but occur in pockets of 100 to 10,000 acres throughout the region, making the area more suited to a cropping-grazing programme than some of the more exposed plains of Queensland.

SOIL TYPES.

The open downs and the brigalow lands are the most important soil types in both the Darling Downs and the Central Highlands regions. In Central Queensland, depth and type of soil are subject to considerable variation even within the broad classification groups. The soils are more variable in these respects than similar soil groups on the Darling Downs,

Plate 3.

Open Downs Country Near Capella, Carrying a Crop of Kalo Sorghum. This picture was taken on a Q.B.F.C. holding; part of the Peak Range is visible in the background.

[*Photo. by "Queensland Country Life."*

though both groups are generally comparable in structure, appearance and fertility.

Soil depth varies from 1 ft. to 6 ft., with an average depth of approximately 3 ft. Generally the crests of the rises consist of a dark-brown loam which is often comparatively shallow. This grades down the slopes into darker, deeper and heavier soil types. The open plains are characterised by heavy black clay soils almost identical with those of the Darling Downs.

Varying quantities of surface stone, sufficient to prevent effective cultivation, occur over areas ranging from a few square yards to hundreds of acres. Often the occurrence of stone cannot be foreseen until the surface soil is disturbed by the plough; care is therefore required when choosing sites for cultivation.

In the so-called brigalow areas the usual brigalow-belah scrub is replaced by a brigalow-yellowwood association. The underlying soils are usually grey-brown calcareous clay loams. In some parts of Central Queensland the brigalow is less vigorous than in the southern areas of the State. In addition, soil analyses suggest a slight phosphate deficiency in some areas.

RAINFALL.

Though the soils generally are of high fertility, the prospects of successful crop production are governed chiefly by rainfall.

The Central Highlands rainfall is characterised by an annual total comparable with that of the Darling Downs (see Plate 1 and Table 1), although there are differences in distribution and reliability. While the Central Highlands receives a lower winter total than the Downs its summer rainfall is higher though more erratic and unreliable. For example, April average for both regions is 154 points, but the chances of the Highlands receiving this total during April of any one particular year are less than are the chances of the Darling Downs. However, the greater summer rainfall partly compensates the Central Highlands for its low winter rainfall and the general unreliability of falls.

Summer rains are largely monsoonal and falls of up to 10 inches may be recorded in the space of one or two days. Storm rains are experienced but often these may be of little benefit owing to excessive runoff and evaporation during the days of intense heat.

Rains from the summer monsoons, which provide ample moisture for storage in the soil, largely compensate for any disadvantage in total rainfall or monthly distribution, provided agricultural practices are designed to derive full benefit from these rains.

TEMPERATURES.

The mean maximum and mean minimum temperatures are high in Central Queensland (see Table 1).

The frequency of heatwaves is also high. For example, between 1914 and 1950, periods of two consecutive days with a maximum temperature of over 100 deg. numbered 57 at Clermont compared with only 18 at Dalby and 5 at Pittsworth.

It is suggested, however, that the effect of heatwaves on growing crops may not be as severe as is generally considered. As long as a plant such as grain sorghum has an adequate supply of soil moisture it will withstand most heatwaves of the intensity normally experienced in Central Queensland. This applies to plants at both seedling and flowering stages. In the United States, for example, some of the successful sorghum growing areas experience higher temperatures and a lower humidity than the Central Queensland Highlands.

Because of the high daily temperatures the transpiration of moisture from the plant leaves is high. Thus plants have greater soil moisture requirements than in the cooler regions further south.

Frost incidence appears to be extremely localised. Papaws and bougainvillea flourish in many centres, and it is quite normal for tomatoes to be grown the whole year round in some areas. In other areas, however, killing frosts may occur either early or late in the year. On the average, the district has a frost-free period two months longer than the Darling Downs. Local knowledge aids in determining the frost risk associated with particular sowings.

CLIMATE AND SOIL AND FARMING PRACTICES.

From the foregoing it is seen that the erratic rainfall and high daily temperatures could make agricultural production somewhat hazardous. Fortunately, these hazards are largely offset by good monsoonal rains and a soil type ideally suited for storing them. Around these four characteristics agricultural practices must be evolved.

Fallowing.

Because of the rainfall unreliability, crops can be expected to experience lengthy periods without rain. This, coupled with high crop moisture requirements and the likelihood of heatwaves, stresses the need for ample

reserves of moisture stored in the soil. The following points can be emphasised:—

(1) Conservation of moisture by fallowing is the key to successful crop growing in this area and the monsoonal rains offer by far the greatest scope for moisture conservation. Surface soil temperatures are at their highest at this time. This stimulates bacterial action, which results in the supply also of adequate nitrates for the ensuing crop.

(2) Moisture loss through evaporation is high and fallowing techniques must be designed, so far as is practicable, to prevent such losses. Stubble-mulch practices will assist in reducing evaporation, and also minimise the erosion hazard associated with fallowing.

(3) Because of the rainfall unreliability, even during the November-March period, summer crops must only be sown on fallowed land holding sufficient moisture to carry the crop over without rain for at least 6-8 weeks.

(4) For winter cropping the expectation of rain must be disregarded, and all of the crop moisture requirements must be stored in the soil prior to sowing.

The adoption of moisture conservation measures along these lines should increase the cropping surety and potential to that of the Darling Downs, although the frequency of cropping may not be as high.

Soil Erosion.

On the undulating downs soils, the monsoonal rains, as well as the storm falls, present an erosion problem. Even though slopes may appear slight, their very extent allows a build-up of runoff water which can cause considerable damage to unprotected cultivation areas.

Plate 4.

Aerial View of Typical Downs Country in the Central Highlands, with the Peak Range in the Background. This view shows the scattered nature of the timber in otherwise open undulating country. The dark area shows the pattern of initial cultivation by the Q.B.F.C.

[*Photo. by "The Courier-Mail."*

Some of this erosion trouble may be prevented by certain cultural methods and most of it can be controlled by the application of standard soil conservation practices. However, it is possible that by the adoption of a strip-cropping technique in the initial break-up of virgin land and the application of stubble-mulching procedures the need for contour bank construction or other earthworks can be considerably reduced. The strip-cropping method is well suited to this area, where land holdings are fairly extensive.

Soils and Cropping.

It is likely (and it is recommended) that in the early stages of development agriculture will be confined mainly to the open downs country.

As previously stated, quantities of moisture must be stored in the soil for safe cropping. It must then follow that the greater the soil depth, the greater the moisture storage potential of the soil and the greater the chances of crop success. There is a practical limit, however, to such soil depth requirements, and under most conditions no more than 4 ft. would be necessary.

In selecting areas for cultivation, shallow soils of about 1 ft. in depth should be avoided. Preferably selected soils should be no less than 2 ft. in depth, and if sufficient moisture is to be stored to give a reasonable guarantee of success with winter crops, a depth of 3-4 ft. will be necessary.

It is true that if seasonal rains happen to be good, 1 ft. of soil will support quite satisfactory crops. Against this it must be remembered that, broadly speaking, it takes all of the moisture capable of being stored in about 4 ft. of these soils to produce a satisfactory crop if no rain is received during the growing period.

Whilst the downs soils, more especially the heavier types, present some difficulties in cultivation and seed germination, they are nevertheless more desirable than some of the light-red forest soils. The latter may be more simply worked and may give good germinations, but they do not possess the all-important capacity to hold large quantities of moisture that is so necessary during most seasons.

Crop Behaviour.

Broadly speaking, all agricultural crops grown on the Darling Downs can be produced equally well in the Central Highlands, although in the latter area they may require more specialised treatment. However, the higher mean temperatures and possibly other climatic factors induce plant characteristics not so apparent in the more southern regions of the State.

In particular, the value of sorghum, the most important summer crop of the area, is greatly enhanced because of its ability to ratoon. It is customary to get several grazings off a crop of grain sorghum after the grain is harvested. Although frost in many areas will destroy all or portion of this ratoon, the plant itself is very seldom killed outright. Thus it is the rule rather than the exception for sorghum ratoons to provide grazing over the winter months. Of course, ratoon growth can occur only if soil moisture is available.

The following example will stress the importance of sorghum ratoons. A crop sown in January 1953 yielded 36 bus. per acre; it was heavily grazed throughout the winter and yielded 24 bus. per acre the following summer. Even then this crop continued to ratoon after harvest and again provided good grazing in the second winter.

Further, Sudan grass, an annual in the cooler regions of the State, becomes almost a perennial in the Central Queensland Highlands. Stands subjected to grazing have been known to persist for 4-5 years. With judicious management, it is likely that Sudan grass will form the basis of a good semi-permanent pasture.

Plate 5.

A Cultivated Area Near Capella in 1948. This gives some idea of the gently undulating slopes which are typical of the Central Highlands district.

[*Photo. by "Rockhampton Morning Bulletin."*

This regrowth characteristic of sorghum is particularly important in this area where crop grazing forms the basis of agricultural pursuits.

Past Agricultural Experience.

It is largely the operations of the Queensland British Food Corporation over a period of six years that have popularised agriculture in the Central Highlands. This venture demonstrated beyond doubt that crops can be grown in the area and that crop residues and stubble growth are of grazing value during the dry winter and spring months.

Few individual farmers have been operating over the same period as the Q.B.F.C., but in 1954 there were an estimated 80 individual growers in the region with crop acreages ranging from 100 to 2,000 acres. Many of these areas were sown solely for grazing, while the remainder were intended for grain production followed by stubble grazing. Over the past six years, however, whether such areas were sown for grazing or for grain, and whether by individuals or the Corporation, those influences previously discussed have clearly left their mark. This is illustrated by the facts that—

(1) Fallowing has amply proved its worth.

(2) Soil erosion has left its mark.

(3) The ratooning characteristics of sorghum have greatly enhanced its value as a dual-purpose crop.

Sorghum Results.

Those growers who have been cropping sorghum over the past 4-5 years appear to have averaged 24-36

bus., with occasional crops yielding 60 bus. and more. In 1953-54 approximately 12,000 acres of crop were sown for an average yield of 22-23 bus., with well-established growers recording averages of 30-40 bus. over areas of 500 acres or more.

This particular season's rainfall was well above average. However, to compensate for this, possibly 20% of the area sown was virgin soil hurriedly prepared by new growers.

In Table 2, the results of the Queensland British Food Corporation's sowings are tabulated. In studying these it is well to remember the difficulty of maintaining high yields per acre over extremely large areas. Also, the agricultural operations were conducted on a 40-hour week basis, which system does not lend itself to the correct timing of operations which is so essential in grain production.

These figures, perhaps, are not impressive, but they should be viewed in light of the fact that the grain sorghum mean yield for Queensland is only in the vicinity of 20 bus. Moreover, the table does not account for the benefits derived from grazing the stubbles, nor does it show that yields, in some cases over areas of 2,000 acres, averaged over 60 bus. on some individual sowings. This last fact is important because it indicates the potential of the area.

Further, the history behind Table 2 gives some idea of seasons within the area and of cultural practices that must be used to suit these seasons. Of the six seasons, three (1948-49, 1949-50 and 1953-54) gave good rains during the crop's growing period. In these seasons planting rains did not occur until very late in the season, as evidenced by frost damage to the maturing crops. In the remaining seasons, little rain was recorded during the 1950-51 and 1951-52 growing periods and none in 1952-53.

TABLE 2.

Grain Sorghum—Queensland British Food Corporation.

Year.	Acreage.	Yield (bus./ac.)	Remarks.
1948–49 ..	29,000	10·8	Estimated 60% of crop lost through frost damage and lodging
1949–50 ..	66,000	18·1	Up to 30 inches rain recorded on much of mature crop ; considerable loss
1950–51 ..	40,000	8·5	Only 30,000 acres harvested, remainder totally failing through lack of moisture
1951–52 ..	57,000	5·7	Only 27,000 acres harvested ; again lack of moisture
1952–53 ..	9,000	20·8	No effective rain after germination
1953–54 ..	5,000	28·0	Frost damage reduced yields

Mean Yield over six years = 15·3 bus./ac.

Note.—Yield averages were assessed on areas sown and not on areas harvested ; acreages and yield data are approximate only.

During 1948-52 fallowing was not practised, it being the policy to grow the crops almost entirely on the seasonal rains. During the good seasons this was quite satisfactory, but in the dry periods of 1950-51 and 1951-52 it resulted in crop failure. Yet in 1952-53, because substantial amounts of moisture were stored in the soil, an average yield of nearly 21 bus. was recorded without any effective rain being received between germination and maturity. Certain areas gave yields as high as 39 bus. under these conditions.

Sorghum has not been tried to the same extent solely for grazing as for grain production. However, during 1954 a crop of grain sorghum with grain formed topped off bullocks at the rate of 1½ beasts to the acre over a 3-months period and gave an estimated return of £5 per acre.

A crop of sweet sorghum was similarly grazed; 100 acres carried 2,000 sheep for 12 weeks, during which period the sheep grew ¼ in. more wool than others from the same flock in adjoining natural pastures. After this area had been spelled for six weeks the ratoon growth was waist-high and again ready for grazing.

Wheat.

Wheat, though not grown as extensively as grain sorghum, has performed well in this region, yield averages over the past years ranging from 9 to 36 bus. In 1954 some 6,000 acres of wheat were sown for grain production. Good pre-planting rains which allowed a build-up of soil moisture, coupled with favourable winter rains, resulted in the production of excellent crops. Both individual farmers and the Queensland British Food Corporation recorded average yields of 50 bus. over considerable areas.

Miscellaneous Crops.

Oil crops such as linseed and sunflowers, especially the latter, are well suited to the area. Linseed cannot yet be widely recommended until more is known of its oil content under Central Queensland conditions. Miscellaneous summer and winter crops in popular production on the Darling Downs appear to do equally well in this region.

Although recent sowings of maize and cotton have been few, these crops appear to show little promise. Grain sorghums have replaced maize, and, in general, cotton does not fit into the farming programme because its residue has no grazing value. Further, cotton crops grown on the seasonal rains are risky because of the general unreliability of the falls. On the other hand, well fallowed land with a high soil moisture content tends to have a correspondingly high nitrate status, which results in lush leafy plants with low yield prospects.

LIVING AREAS.

The question as to what comprises a minimum living area in this district is a contentious one. Areas too small will retard development and areas too large may, in many cases, continue to lead to inefficient use of the land. This aspect is one to which intending settlers should give much consideration.

The State Government, by throwing open some of the best of their Q.B.F.C. holdings in approximately 5,000-acre blocks, has given a lead in the matter. These blocks consist of at least 1,000 acres of open arable downs and are primarily designed for a combination of cropping and grazing.

These areas have caused some comment, many believing them to be too small and certainly few suggesting they are too large. It is suggested here that in the light of past performance in this region an area of about 5,000 acres is a generous living area. This assessment takes into account the advantages of modern machinery, and comparisons with other districts within the State.

Mixed country with a fair proportion of open downs, uncultivated, will carry a sheep to three acres. Twenty years or so ago, before the native Queensland bluegrass was partly eaten out, the same land carried up to one sheep to the acre.

Through cultivation, cropping, fodder conservation and stubble grazing it should not be too much to expect an increase in carrying capacity to at least a sheep to 2 acres. In fact, a sheep to 1 acre would only be returning the land to its natural capacity under original native grasses. Today, 2,500-3,000 sheep afford a

Plate 6.

Initial Breaking-up of Q.B.F.C. Country at Peak Downs. Some idea of the friable nature of the Downs soils may be gained from this picture.

[*Photo. by "The Courier-Mail."*

reasonable living. Of course, prices may not remain at their present level, but then, even during past periods of low wool prices, some growers in the area have existed (though the existence may have been poor) on 2,000 sheep.

Apart from the foregoing, there are local instances where areas of considerably less than 5,000 acres have afforded a most profitable living over the past five years. Outstanding examples are two of the smallest mixed farming properties, one of 1,400 acres and the other of 2,000 acres, both of which have demonstrated the potential of the area under sound farming practices.

Further, on the Darling Downs 640 acres of open downs land is considered an adequate living area. At least twice to thrice this area of open downs in this district, plus 3,000-odd acres of good grazing land, would appear to be capable of affording an above-average existence.

The objections to areas of around 5,000 acres are based on the sure recurrence of drought years. Under sound farming management it is likely that the cultivated areas will then really show to advantage, because growers should be able to make use of the moisture stored in the fallow from the previous rains.

Although there are hundreds of thousands of acres of first class potentially arable open downs and brigalow country, such land is at the moment mostly available only in big holdings of from 10,000 to 50,000 acres of mixed country.

Land values vary according to quality and quantity of area, but recent sales of approximately 10,000-acre areas, with a good percentage of open downs country, have ranged from £2 10s. to £4 10s. per acre. Compared with other areas in Australia these values are low when it is considered

that land clearing and maintenance (fertilizer) costs are nil.

It is probable that more and more land of this type will gradually become available as further large holdings come up for subdivision and are available for public selection. Private land sales are also being made. Whatever the price at these sales may be, whether £2 or £5 per acre, the ratio of land price to output potential would seem somewhat higher than on the Darling Downs, where recent sales of £20-50 per acre have been recorded.

FUTURE AGRICULTURAL PATTERN.

It appears that agriculture is now firmly, though lightly, established in the Central Queensland Highlands. However, the original concept of those advocating a combination of cropping and grazing in the area (that is, that stock should be employed to make full use of crop failures) must be readjusted.

Crops must be grown for a specific purpose, for grain and stubble grazing or for straight-out grazing; farming is so costly and can now be so well controlled that crop failures cannot be contemplated. By using correct techniques, failures will be reduced to the minor incidence associated with similar agriculture in other areas of the State.

While it appears clear that the broad pattern of development will be along the lines of cropping plus grazing, the extent of each and the method of crop utilisation will depend on

Plate 7.

Queensland Bluegrass and Flinders Grass Downs Near Clermont. The mountain in the background is the "Lord's Table".

market demands and type of individual property. Many problems associated with this development have yet to be solved, but one of the prime objects of cropping will be to supply good grazing material during the dry winter and the spring months when normally the native pastures are dry and have little feeding value.

At the moment this objective is being fairly satisfactorily fulfilled by the growing of grain and sweet sorghums during the late summer and using either the whole crop or the stubble residues for stock feeding. The ratooning characteristics of sorghum in this area enhance the value of stubble to a degree beyond the conception of most sorghum growers in the southern Queensland districts.

Winter cropping, too, has a part in the programme. During many seasons and on well-prepared land it will be possible to germinate a winter crop on the soil moisture stored from the summer rains. This procedure will not always be necessary, as early winter rains do occur fairly frequently, but during land preparation this possibility must be kept in mind.

During the season of 1954 one area of wheat was established by sowing 8 weeks after any effective rain. However, in such cases a post-planting rain is needed to allow sound root development, for plants may be pulled up during grazing even though they would be capable of yielding an average quantity of grain.

Oats are worth consideration as a winter grazing crop, being normally preferable to wheat for this purpose. Considerations of land preparation and soil moisture conservation will be similar to those for wheat. However, oats can generally be safely sown much earlier than wheat and therefore offer opportunities for easier establishment immediately following the late summer rains.

Plate 8.

Soil Erosion on Unprotected Slopes in the Central Highlands District. This gully gives some idea of the destruction that can be caused in one season of heavy rainfall unless contour banking or strip cropping is adopted.

Well-balanced development necessitates steps being taken towards the accumulation of some fodder reserves. Cropping simplifies this project, but the form in which the reserve is to be stored will depend on type of property, crops and pastures available, and particularly on the type of animal associated with the cropping. All forms of reserve—grain, ensilage, crop hay or bush hay—have points in their favour and the Department of Agriculture and Stock has already initiated an experimental programme to determine the relative merits of the various forms of these reserves.

The ideal farming programme envisaged is one based upon strip-cropping. Under such a scheme the area to be farmed is divided into strips which follow the natural contours of the land. Such strips might be in series of three, in which grassed strips alternate with strips under fallow and strips carrying crops.

The grassland strips are intended primarily for soil protection, and secondarily for grazing, hay, or grass seed production. Such strips might be under regenerated native pasture (where natural regeneration of useful species occurs), or under suitable sown pastures or Sudan grass.

Little is known at present of the best methods of pasture establishment on these soils, and investigations are being carried out in this field. At the present time in many sections of the district, Sudan grass could logically be regarded as the safest species to use as a perennial pasture of a few years' duration.

As the pastures show signs of deterioration, strips are rotated so as to bring pasture strips under cultivation and portion of the cultivated strips under pasture.

Some flexibility in planning is essential in such a scheme. Thus cultivations may be sown to either summer or winter crops; stubble may supply bountiful or sparse grazing; and the fallow period may be long or short according to moisture storage requirements. However, the important point is that the principle of contour strip-cropping must be observed. Otherwise, the alternative is likely to be serious losses of soil or the expensive construction of protective structures.

The trend towards more intensive use of the Central Queensland Highland areas is reflected in increased agricultural activity over recent years. The State Government's subdivision of much of the former Q.B.F.C. lands has focused considerable attention on the region and resulted in many applications for the blocks.

Local companies and individual graziers once sceptical of agricultural development are now cultivating land. Farmers from south Queensland and southern States are gradually moving into the area, where, on their accustomed standard, land quality is high and values are low. But success will not come simply.

From a study of climatic and soil data, by comparing this area and the Darling Downs, and by observation over the recent years of agricultural expansion, the pattern of success in the Central Queensland Highlands may be stated as follows:—

The area can be farmed most successfully, grain sorghum and wheat both having a potential yield as high as 60 bus./ac., but only if the land is well and correctly farmed. There must be no half measures. Only correct farming will succeed and poor or mediocre farmers will fail to exist. In other agricultural areas of the State, "hit or miss" farming methods may hit 50 per cent. of the time, but here they will seldom succeed.

STORE WHEAT SAFELY!

Wheat put into silos with too high a moisture content will spoil. The only sure way to assess the moisture content of the grain is by a chemical estimation.

The Department of Agriculture and Stock offers to make a rapid and free estimation of the moisture content of grain before it is harvested. The grain should be sent in a 2 lb. glass jar with a tight lid to Agricultural Chemist, Department of Agriculture and Stock, Brisbane (if posted), or Agricultural Chemist, Department of Agriculture and Stock, Roma Street (if railed). The lid should be taped with a few layers of zinc oxide plaster or scotch tape.

Portable moisture meters are on the market. Growers should seek advice from the Department as to suitable makes and send the meter they buy to the Agricultural Chemist to have it accurately calibrated so that there will be no doubt that it is registering correctly. Wheat should not be put into silos with a moisture content of more than 12 per cent.

Once in the silo, the wheat should be inspected weekly. A small amount of grain should be taken from around the inspection openings. Any grower in doubt about the moisture content should send a sample of the grain to the laboratory.

Grain that is too moist or heating should be turned over into another silo or carefully dried with a draught of hot air.

SUMMER MANAGEMENT OF IRRIGATED PASTURES.

Satisfactory summer production from irrigated pasture depends on careful grazing. If the pasture is to stand up to hot weather, there must always be a ground cover of 3 in. to 4 in. of leafy growth.

Mr. A. Nagle, Irrigationist in the Department of Agriculture and Stock, recommends the inclusion of paspalum in the sowing mixture for pastures in coastal and sub-coastal Queensland as a method of increasing summer production and extending the life of the pasture.

The insulating effect of a ground cover of pasture growth may reduce temperatures by as much as 30 degrees. As temperate-climate pasture species are the major components of irrigated pastures in Queensland, the value of a ground cover in keeping down temperatures is readily apparent. High temperatures seriously retard the growth of cocksfoot and phalaris and may even kill white clover and ryegrass. Bare patches encourage the invasion of inferior species and productivity declines.

Management of irrigated pasture should, therefore, always be directed towards maintaining a ground cover of 3 in. to 4 in. of pasture during summer.

Where strip grazing is practised there is a tendency to overgraze in an endeavour to make fullest use of the forage. Stocking rates should be reduced in summer to obtain a lighter grazing and so retain the ground cover. This is not easy in a clover-dominated sward, as stock tend to graze clover unevenly. Usually portions are overgrazed and other patches undergrazed. The overall benefit of lighter grazing on these pastures is often merely a reduction in the closely grazed area.

More effective summer management is possible when the pasture mixture contains paspalum. Care must be taken, however, to ensure that the paspalum does not smother the clover. Summer management of a white clover-paspalum pasture demands heavy stocking with occasional mowing to reduce any rank growth of paspalum that may be suppressing the clover.

Mulching the Strawberry Crop.

By K. M. WARD, Senior Horticulturist.

Sometimes a little extra trouble and expense in producing a crop will increase the monetary return to the grower. This is particularly so of mulching in strawberries, for the value of the crop depends on the brightness, size and appearance of the berries.

The term mulching as applied to strawberries refers to several different practices. The most common of these is the spreading of materials such as tanbark (Plate 1) and straw on the surface of the soil around the plants. A second practice, now outdated, requires the maintenance of a loose layer of soil on the surface by frequent cultivation. A third practice, used in cold regions only, involves covering the plants with straw to protect them against winter cold.

In Queensland, the main interest is in an organic mulch round the plants.

SOIL IMPROVEMENT.

A layer of mulching material lowers the temperature of the soil, greatly reduces evaporation from the surface and thus minimizes losses of soil moisture. It also reduces the soil compaction which results from repeated irrigation and from pickers tramping up and down the rows during the harvesting period. Water penetration is greater in a loose soil protected by a mulch than in a hard, packed soil. A mulch also helps to prevent loss of soil by erosion.

RISK OF FROST DAMAGE.

In areas where frosts occur, mulching the strawberry crop with organic wastes, especially straw, is hazardous, for such materials may increase the risk of damage to the plants. Low temperatures are most pronounced on the surface of the mulch in the vicinity of the plants themselves; beneath the mulch, temperatures are higher than on the surface. That is why the practice of laying a 4-inch layer of coarse straw over the crop and soil gives effective protection against winter cold and frosts in temperate climates.

WEED GROWTH REDUCED.

The extent to which weed growth is suppressed by a mulch depends upon its thickness. Four inches of sawdust will give almost complete control of weeds, but with coarser

materials an even greater thickness may be necessary.

Although it is scarcely practicable to completely suppress weeds in strawberries by mulching, a moderate cover makes weed control easier. The partial suppression of weeds obtained reduces costs of production on a crop which requires a good deal of labour for harvesting, irrigation and other activities. Mulching does not, however, obviate the necessity for weed control work in the course of soil preparation prior to planting.

With most mulching materials, and especially sawdust, a temporary shortage of nitrogen may occur within a few weeks after they are applied. It is necessary, therefore to look for nitrogen deficiency symptoms in a mulched crop and, if they appear, to apply a side dressing of sulphate of ammonia immediately.

FRUIT QUALITY IMPROVED.

By providing better soil conditions, a mulch should stimulate the growth of the strawberry plants and produce better fruit. However, the more favourable temperature and moisture in the soil are not alone sufficient to ensure full production; adequate supplies of nutrients and a suitable soil reaction (pH) are also major factors. Fertilizing and liming, when necessary, must not, therefore, be neglected.

Plate 1.

Tanbark Mulch in Strawberries. The mulch is placed in position about three weeks after planting out.

BETTER CROP NUTRITION.

A surface mulch not only improves the soil as a medium for root development in strawberry plants but also influences the nutrition of the crop. It maintains the moisture content of the surface soil at reasonable levels, which ensure continuity of growth, particularly in warm weather. Decomposition of the lower layer of the mulching material proceeds rapidly and without interruption and ultimately this process makes nutrients available to the strawberry plants.

One direct effect of the mulch is to keep the fruit free from contamination by soil particles. This obviates any necessity for brushing or washing the harvested fruit and greatly aids in the preservation of that bright,

fresh and unbruised appearance which is a characteristic of top quality berries.

MULCHING MATERIALS.

In Queensland, mulching materials which may be used in a strawberry crop are tanbark, oak leaves (*Casuarina*), blady grass, peanut and sunflower hulls, and other seed refuse. Of these materials, tanbark or tanner's waste is the most popular. Sawdust, although an effective mulch, cannot be used in a strawberry crop, for the particles stick to the berries and are difficult to brush off without damage to the fruit.

Tanbark is an inert material with little or no manurial value but its physical properties are good. It gives a better cover than blady grass or straw, two materials which are excellent for laying along the rows to keep the berries off the ground. Tanbark, oak leaves, peanut hulls and similar long-life materials may be used on more than one crop if they can be raked into heaps after the runners have been removed from the beds.

MANAGEMENT OF MULCHED CROPS.

Time of Application.

If the mulch is required primarily to provide the berries with a clean surface to lie on, it need not be placed in position until flowering has commenced. On the other hand, if the mulch is also needed as a soil conditioner the soil should be mulched about 3 to 4 weeks after planting out, when the young plants are well established. Mulching at early flowering is the more common practice in the Metropolitan district.

Amount Required.

Sometimes the mulch is spread only along the rows of plants with the main object of providing a clean surface for the strawberries. However, if the maximum benefit from mulching is to be obtained, complete coverage of the soil is necessary.

When a tanbark mulch is spread to a depth of 2 inches, 1 cubic yard of material will suffice for an area of 13 square yards; this is equivalent to 130 cubic yards per ½ acre. Where the mulch is applied only in a 12-inch strip along the row, about 65 cubic yards would be necessary for each ½ acre, assuming that the crop is planted in single rows and the rows are 2 feet apart.

Fertilizer Applications.

When the crop is to be mulched, the initial fertilizer application should be made as a basal dressing in the furrow, just prior to planting out. By this means, the plants are assured of a good supply of nutrients when they are young, and temporary shortages created by the decomposition of the mulch are unlikely to occur.

Side dressings of fertilizer at the early fruiting and mid-season stages (about June and August respectively) can be applied on top of the mulch and washed through to the roots with irrigation water.

Weed Control.

A 2-inch mulch will not suppress weeds completely. The amount of weed growth in the strawberry crop can be reduced by several cultivations during the final stages of land preparation for planting and also between planting out and the spreading of the mulch. Weeds which appear in the mulch are pulled by hand as cultivation by wheel-hoe or other implements is not practicable.

VEGETABLE PRODUCTION

Cabbage Varieties in Southern Queensland.

By A. R. CARR, Experimentalist, Horticulture Branch.

Cabbages are grown extensively in southern Queensland and the crop ranks third in importance among the major vegetables.

In coastal areas (Plate 1), they are grown during the autumn, winter and spring months, but in subcoastal districts such as the Lockyer Valley autumn planting is the rule. Most crops in these areas are irrigated. At Stanthorpe, where the climate is much cooler, cabbages are grown as a summer crop without irrigation.

VARIETAL TRENDS.

One of the most interesting developments in cabbage production in coastal Queensland has been the change in varietal preferences since the end of World War II.

Plate 1.

A Commercial Crop of Cabbage—Rochedale District.

Prior to 1939, Burpee's Allhead, Henderson's Succession and English Allhead were popular varieties; Drumhead was also planted to some extent late in the season. All of these are flat-headed types grown extensively in other countries and the bulk of the seed required for commercial plantings here was imported from America.

During the war, volume production of the crop was more important than the consumer demand for particular varieties and a considerable amount of produce was sold on a weight basis. Size was, therefore, an important criterion in selecting varieties for planting. All Seasons became popular, though it was a large-headed variety and apt to become coarse and unattractive unless conditions were uniformly favourable for the crop during the growing period. At times, large quantities of inferior heads were placed on the market, and this is partly responsible for the post-war consumer preference for the finer quality round-head and conical-shaped cabbage.

Today round-head and conical varieties are grown extensively, although drumhead types are still popular in non-irrigated areas such as Stanthorpe and for early crops on the coast.

Although several cabbage varieties are available for commercial production, relatively few meet all the requirements of any particular district. They are usually classified according to their shape and colour. Those of commercial importance in Queensland fall into three groups, known respectively as ballhead, drumhead and conical.

Plate 2.

Enkhuizen Glory, the Most Popular Cabbage Variety in Southern Queensland.
It is one of the ballhead types.

BALLHEAD GROUP.

This group includes Enkhuizen Glory, Mid-Season Market, Copenhagen Market, Golden Acre and similar types. They mature more quickly than varieties in the drumhead group and produce small to medium-sized, round heads. Most of the heads are compact, with few outer or wrapper leaves, and the core is comparatively small. The leaves are small to medium in size and light to mid-green in colour.

Enkhuizen Glory is the most popular of the ballhead varieties grown in Queensland (Plate 2). The plant is fairly tall, with a moderate spread, and matures later than any other variety in this group. The head is

firm, mid-green in colour, with compact leaves, the quality and carrying capacity being good. The plant type is reasonably uniform, and under good cultural conditions the heads average 5 lb. in weight. *Utility* is a selection from Enkhuizen Glory and is notable for the compactness of the head and its ability to retain good colour after harvesting; it is a late-maturing type.

Mid-Season Market is widely grown in the Redlands district on account of its good carrying qualities. The plant is moderately tall and spreading in habit but the head type lacks uniformity in shape. The typical round head is small to medium in size, with an attractive light-green to mid-green colour, and matures slightly earlier than Enkhuizen Glory. The average weight is about 4 lb.

Copenhagen Market is the oldest of the ballhead varieties grown in Queensland and is the parent of Enkhuizen Glory, Mid-Season Market, Golden Acre and Vanguard. The plant is squat in appearance, with erect, light-green outer leaves. The head is compact, with a short central core. The variety has never become popular, on account of the unattractive colour of the mature head, which is a disadvantage in markets which prefer the mid-green types. Average size is about 4 lb. *Golden Acre* is a small early-maturing strain of Copenhagen Market with the same undesirable yellowish-green colour of the head.

Plate 3.

Typical Head of Succession, a Drumhead Cabbage.

DRUMHEAD GROUP.

The best known of the drumhead cabbage varieties is *Succession,* the head of which is compact, with a somewhat pronounced central core (Plate 3). The colour varies from mid-green to blue-green, and the large wrapper leaves tend to curl away from the head. If grown quickly, head quality is good but it deteriorates considerably if the crop is checked during the growing period. Other drumhead

types of cabbage are similar to Succession and differ mainly in time of maturity.

During recent years, drumhead cabbage have been largely supplanted by the ballhead types on the coast, except in midsummer plantings.

First Early Improved is a selection from Early Jersey Wakefield and matures its crop earlier than the parent type. It is a hardy variety which usually produces a very high percentage of marketable heads, but sometimes off-type plants are excessive in

Plate 4.

Early Jersey Wakefield, the Best of the Conical Cabbage Varieties.

CONICAL GROUP.

The two best known varieties in this group are Early Jersey Wakefield and First Early Improved, both of which are becoming increasingly popular in the Brisbane markets.

Early Jersey Wakefield is an early variety with a small pointed head which is dark-green in colour (Plate 4). The quality is generally excellent. The wrapper leaves are relatively smooth and stand out well from the head. Unfortunately, these leaves are brittle and break very easily; the firm, crisp head is therefore easily damaged in transit to market.

commercial plantings. The head is medium in size, compact and very popular on local markets. Like Early Jersey Wakefield, heads of First Early Improved are easily damaged in transit to market.

RECOMMENDED VARIETIES.

In coastal areas where the crop is grown under irrigation during most of the year, a range of varieties is required for successional plantings during the season. From this range, the grower must select types which are suited to his own farm and acceptable on the market.

Recommendations for southern Queensland are outlined in Table 1. They are based on trials at the Redlands Experiment Station during the past five years and field observations on the several commercial varieties in the more important cabbage-growing districts. All varieties with the exception of the small-headed, quick-maturing types, such as Early Jersey Wakefield, carry reasonably well. This and similar types must be marketed in close proximity to the producing centre, where handling methods can be effectively supervised and injury kept to a minimum.

TABLE 1.

Recommended Cabbage Varieties.

District.	Variety.	Seedbed.	Field Planting.
Coastal	Succession ..	Mid-December to mid-January	Mid-January to mid-February
	Enkhuizen Glory	Early February to June	Early March to July
	Mid-Season Market	Early February to June	Early March to July
	Early Jersey Wakefield	Late February to July	Late March to August
Lockyer Valley ..	Enkhuizen Glory	February to May..	March to June
Stanthorpe	Succession ..	Late July to early November	September to early December

BANANA FRUIT FILLING.

A banana grower can do a great deal to remedy poor filling of the fruit. Poor filling is encountered by most growers at some time or other, and it can result in a heavy financial loss. Bunches of partly filled, angular fruit do not command good market prices.

Mr. F. W. Berrill, Horticulturist in the Department of Agriculture and Stock at Nambour, states that the solution to the problem lies in the use of good-sized, healthy, vigorous planting material and the subsequent management of the plantation.

Plantation management should be directed towards promoting and maintaining maximum vigour in the plants. To develop an efficient root system and a large, healthy crown of leaves, the plants require adequate fertilizer. In addition, shading and weed competition should be eliminated, soil moisture maintained and pests and diseases controlled.

By selecting warm, sheltered sites for plantations much can be done to minimise imperfect filling likely to be caused by low temperatures. The use of hessian bunch covers in cool weather will also improve filling of the fingers, and at the same time produce a more even bunch. Even on northern slopes, the practice of covering developing bunches in late autumn and winter is well worthwhile.

Irrigation is also of great value because an adequate supply of water during dry periods maintains the movement of food reserves from the corm to the fruit.

The Honey Flora of South-eastern Queensland.

By S. T. BLAKE (Botanist) and C. ROFF (Adviser in Apiculture).

(*Continued from page 95 of the August issue.*)

ORANGE TREE.

Botanical Name.—Citrus aurantium L.

Other Common Names.—There are several varieties, each with its distinctive name.

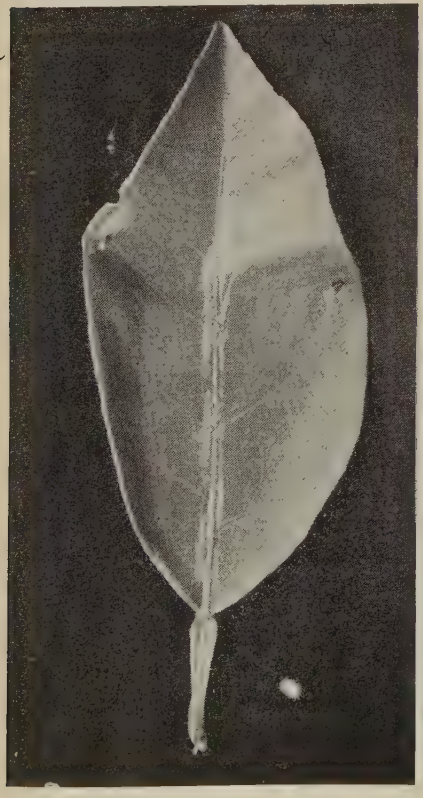

Plate 129.

Orange (Citrus aurantium). Leaf and flowering twigs.

Distinguishing Features.—A fruit tree usually found in cultivation, with thorny twigs, oval glossy leaves with a green expansion along the sides of the stalk and a transverse furrow or joint at its top, white buds and flowers, and a tight-skinned orange fruit (Plates 129-130).

Description.—This is a tree up to about 20 ft. high with a dense glossy green crown and spiny branches. The leaves are oval, somewhat pointed, paler underneath, about 2-4 in. long, about twice as long as wide, sometimes faintly serrate, distinctly jointed on to the stalk, which is broad and nearly leaf-like; at first sight it looks as though a big leaf is jointed to the top of a small one. The flowers are borne amongst the leaves and are quite white, even when in bud, and strongly scented. There are five very small green sepals, five separate oblong petals about 1 in. long and white on both sides, about 20-25 stamens shorter than the petals, and a smaller green ovary and style. The fruit is the well-known orange.

Distribution.—Widely cultivated, either for private use or on a commercial scale, the chief orchards being in the Moreton, Wide Bay and Burnett Districts.

Usual Flowering Time.—August.

Colour of Honey.—Light amber.

Importance as Source of Honey.—Minor.

Importance as Source of Pollen.—Minor.

Plate 130.

Orange (Citrus aurantium). Lawes.

General Remarks.—In citrus areas small quantities of orange honey are often harvested. The honey is first grade, with a characteristic excellent flavour and aroma; it candies readily with a whitish fine grain.

Orange trees provide a small amount of pollen.

Plate 131.

Maize (Zea mays). Leaves, cobs and tassels.

MAIZE.

Botanical Name.—Zea mays L.

Other Common Names.—Corn, Indian corn.

Distinguishing Features.—A crop grown for forage and grain, resembling a very coarse grass, producing one or more cobs along the stem and a tassel at the end (Plates 131-132).

Description.—This is an annual plant, one of the grass family, with a stout jointed juicy stalk mostly 4-10 ft. high with several long, ribbon-like tapering leaves up to 3 ft. long and 4 in. wide. There are

distinct male and female flowers. The male flowers are produced in a tassel at the end of the stalk and the females in cobs along the stem. Both male and female flowers are very numerous, but they are also very small and each is enclosed in a number of scales, so they are difficult to examine without a microscope.

Distribution.—Widely cultivated.

Usual Flowering Time.—November-March.

Importance as Source of Honey.—Nil.

Importance as Source of Pollen.—Major.

General Remarks.—Maize does not secrete nectar, but it is an excellent source of yellow coloured pollen. Often this crop at the time is the only important source of pollen in an area, and some beekeepers move their apiaries accordingly. The results are beneficial to the colonies, and the practice should be extended.

Plate 132.

Maize (Zea mays). Glenore Grove.

[TO BE CONTINUED.]

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ANIMAL HEALTH

First Aid Treatment of Farm Animals.

By W. R. RAMSAY, Assistant Veterinary Officer.

Accidental wounding of animals frequently occurs on farms and stations. Many wounds, especially the minor ones, the man on the land is compelled to treat himself.

In the case of more serious wounds, veterinary aid may have to be sought and a long time may elapse before it arrives. Hence it is essential that the farmer have some basic knowledge of the treatment of wounds and of how to render first aid till assistance does arrive.

On no subject in the animal world is there more controversy or a greater number of theories advanced without foundation of fact than on the subject of wound treatment. There is no point in discussing these erroneous ideas in detail, but it is important that the farmer know the fundamentals of wound healing and tissue repair. By applying this knowledge, he can avoid many pitfalls in treating wounds and have the ability to render first aid in serious cases.

The treatment applied in the first 36 hours after a wound is inflicted is the major influence deciding what course the healing of that wound will take.

How Wounds Heal.

Let us consider first the healing of a clean uninfected wound involving skin and muscle, such as would be caused by a knife cut.

Assuming that no big blood vessels have been cut, the bleeding is soon stopped by a clot forming in the wound. When the edges of the wound are brought into contact by stitching, healing begins. This involves the growth of cells from the "binding tissues" of the body. This growth is called fibrous, scar or granulation tissue. These cells grow through the serum clot formed between the wound edges. As they grow older they contract and draw the edges of the wound together. This effect is often seen when scar tissue puckers at the edges. The scar tissue acts as mortar between the edges of the wound, and the skin grows over it, provided the gap is not too great. If the gap is too great for the skin to grow over, a permanent scar results. Provided there is only a small layer of scar tissue, the healed wound is as strong as ever.

Skin has the power to regenerate itself; muscle has not. Healing in a muscle is always by the formation of scar tissue.

Soon after the haemorrhage ceases in a wound, there begins an outpouring of tissue fluids (or lymph) which contain the white blood cells. These defend the body against invasion by bacteria by literally eating the bacteria in the wound. The lymph tends to clean the wound by carrying bacteria away mechanically if drainage is adequate.

The healing of every wound involves the growth of new tissue (granulation tissue, etc.), which is very delicate at first. Every effort has to be made to foster this growth. The presence of dead or damaged tissue prevents this

growth and consequently slows healing considerably. Hence dead tissue should be removed as soon as possible.

Hair or foreign bodies act in the same way. Thus the presence of a stake in a wound may stop it healing altogether or result in a wound which breaks out periodically through the skin which grows over it. The hair should be clipped back from the wound edges in such a way that the falling hair does not drop into the wound.

The presence of infection has the same slowing effect. If wounds can be treated early enough, very often the bacteria are only on the surface of the tissues and can be flushed off by using very mild antiseptics or saline (1 teaspoonful of salt to 1 pint of boiled water). The antiseptics which have a detergent or cleansing action (for example, Cetrimide and "Zephiran") are very suitable when used at the strength of 1/1000.

If the infection has proceeded a stage further, and other tissues are involved, it may be necessary to open the wound to provide drainage so that any pus built up in the wound may flow freely away. Unless pus is present, it is unwise to open. It is better to apply warm moist dressings to the wound frequently and use penicillin, or sulpha drugs internally, to overcome the infection. Then, should it become necessary to operate, there will be less chance of the infection spreading.

It is not always possible to bring the edges of wounds together for stitching without pulling the stitches too tight. If this is done the stitches destroy the tissue enclosed within them and pull out. It is better to allow this type of wound to heal openly. In this case the union takes place from the depths of the wound upwards in the form of scar or granulation tissue. It is the same type of tissue which joins the edges of the simple type of wound mentioned previously, and should be treated as such. Excessive movement of the part with this type of wound frequently results in the granulation tissue growth from the bottom of the wound becoming excessive "proud flesh." This condition must receive special attention.

Any dressing or antiseptic used on a wound should be very mild. Strong disinfectants are quite definitely harmful. Not only do they slow or stop the growth of new tissue and kill delicate cells, thus increasing the amount of dead tissue in a wound, but they also kill the white blood cells, thus aiding the growth of bacteria. Used on open wounds, antiseptics of excessive strength may result in the production of proud flesh.

Treating a Wound.

Experience has shown that the following is a very simple and effective method of dealing with wounds.

Clean gently with a suitable antiseptic solution and dust liberally with sulphanilamide twice daily. Should flies be troublesome at the time, spraying the animal (not the wound) with DDT may be considered. The use of sulphanilamide in codliver oil as an ointment will be found to be effective in repelling flies. Once the effectiveness of treatment along these lines is seen, the use of harsh disinfectants such as kerosene, turpentine and iodine will be abandoned.

The rate at which a wound heals depends on the treatment it receives and also the age and condition of the animal. In addition, the blood supply to the area plays a part. For example, it is noticed that wounds on the head heal much faster than wounds on the limbs. This is attributed to the fact that the blood supply to the head is more prolific than that to the limbs.

Treatment of Proud Flesh.

Proud flesh is an excessive growth of granulation tissue from the depths of a wound. This results in the new tissue growing out over the wound

edges and producing a cauliflower-like growth of tissue. This is usually black from congealed blood or rubbed red raw and bleeding.

When a wound occurs where proud flesh can be expected (for example, below the knees or the hocks in horses), it is essential to keep the wound very clean, avoid the use of strong antiseptics, and keep a pressure pack in position until healing is normal. The movement of the animal should also be restricted. When proud flesh does occur it must be removed before complete healing can take place.

There are several methods of removing proud flesh. Perhaps the simplest is the application of powdered bluestone. This is more effective if the bluestone is placed on a piece of cotton-wool and bandaged in position for 48 hours. When it is removed a layer of proud flesh is removed with it. The treatment may have to be repeated several times.

Acids are sometimes used to remove proud flesh. This method is considered to be unsafe and unnecessary no matter how applied, because there is always danger of the acid running down and burning the flesh beneath the wound.

Surgical removal and the use of a pressure pack is the most efficient way of dealing with proud flesh.

Control of Bleeding.

The most alarming feature of many wounds is bleeding when some large blood vessel is cut. Arterial bleeding, when the blood is bright red and comes out in spurts, is much more serious than venous, when the blood is dark red and seems to flow out continuously.

Most haemorrhages can be controlled by applying pressure to the bleeding spot by means of a pressure pack of cotton-wool under a bandage. This should be left on for some hours to make sure that haemorrhage has ceased. If the bandage is around a limb, make sure that it is not too tight, or the blood supply to the limb will be cut off. If it has to be tight to control the bleeding, loosen it intermittently to allow blood to flow to the distant part. This can be done without removing the pad.

A tourniquet placed on the limb above the bleeding point will control most haemorrhages. This has to be released intermittently to allow circulation.

If an artery is bleeding it may be possible to seize the end of it and tie it off. Pressure on the bleeding end of a blood vessel allows a clot to form in the end of it and so stop the haemorrhage.

Healing Under a Scab.

A firm scab over a wound indicates that healing is proceeding well. However, should it be loose and have fluid beneath, the scab should be removed, as infection is present.

Abscesses.

The cause of abscesses is often not clear. They may arise from the seat of a bruise, in an infected wound (especially a punctured wound), or from other causes. In each case the treatment is the same. Warm moist dressings applied frequently are very useful. Consideration should be given to using penicillin or sulpha drugs in an effort to stop the abscess from developing. If this treatment is applied correctly the abscess may subside without reaching the point where it has to be opened.

Using the correct dose is most important. Frequently sulpha drugs in tablet form are used in quantities entirely inadequate for the job. The author has known cases where horses were being given a course of sulpha tablets at a dose rate sufficient for a large cat. This can only be described as foolish. The best person to advise you on the use of these drugs is your local veterinary surgeon.

Abscesses should not be opened until they show evidence of "pointing". Then

they should be opened at their bottom-most point so that all fluid in them can run out freely. The skin below the opening should be kept liberally greased so that fluids running down do not cake on the skin and scald. The openings should be wide enough to allow free drainage and to prevent the opening healing too soon. After opening the abscess, it may be syringed out with salt solution, but only very gently. Forcible irrigation may carry infection deep into the tissues.

Restraint.

In the dressing of wounds it is essential that the animal be held reasonably still while the operation is carried out. Apart from some exceptional animals this involves some method of forcible restraint.

Dairy cattle can usually be restrained in the bails with a leg rope and a set of "bulldogs" in the nose. Should this not be sufficient other methods can be found, such as pulling the tail through the legs and up into the flank.

In the last resort the animal can be thrown. A simple method of throwing is to tie a rope around the horns, a half-hitch around the neck, again around the heart girth and again around the flanks. The end of the rope is held behind and the beast then moved away, when it falls without much struggling. Its legs can then be tied out. Should the animal be a milking cow the rope should be padded with hessian to prevent injury to the udder.

The restraint of horses is an art. A great deal depends on the approach of the people involved, but there are several aids which can be suggested. A twitch on the nose can be useful. The use of a twitch on the ear is not recommended. Blindfolding or lifting a foreleg on the side on which one is working may also help.

A serviceable twitch can be made with a piece of wood about 18 inches by 2 inches by 1 inch. (A pick or axe handle is ideal.) Bore a hole through it about 1 inch from the end and tie through it a piece of ⅜ inch cord about 15 inches long. The resultant loop is held over the wrist and the horse's upper lip pulled through it. The loop is then twisted tightly onto the lip. It should not be held in position for more than about 10 minutes, and the lip should be rubbed when it is taken off to restore circulation.

With large pigs restraint is a problem. A crush or a race is useful. The Iowa hog holder is a useful instrument. It is simply made by using a length of conduit or pipe about 3 feet long, and threading through it a length of galvanised mild steel clothesline wire, No. 9 gauge. The wire is looped back and tied through a hole near one end of the conduit, and a wooden handle attached to the other end of the wire. The loop is placed over the pig's snout and held there by the handle. The pig leans back on it, and is so preoccupied with it that minor operations can be carried out with little further trouble.

When to Call for Expert Help.

A wise man knows his limitations. When help is needed the sooner it is called for the better. Frequently this is delayed until the case becomes complicated or even impossible to treat.

There is quite a lot a farmer can do for himself, but there are many things which are too serious for him to handle. In these cases no time should be lost in calling for help.

Aids to Feeding.

By P. ROUND and K. A. TAYLOR, Cattle Husbandry Branch.

Although many dairy farmers in Queensland now use conserved fodders to augment grazing, few have facilities for supplementary feeding. Without adequate facilities for feeding out, much valuable time and fodder can be wasted.

The common practice is to feed a few pounds of grain or other concentrate in the bails during milking, and if any further supplement is required it is often provided by giving cows access to a stack of hay, or by scattering hay about the yards or paddocks.

Where concentrates are fed in the bails, temporary mangers such as tins and boxes are mainly used. These often become broken, causing waste and annoyance. The bulk fodder is usually stored some distance away from the bails and much unnecessary walking and carrying is incurred in feeding.

Hopper and Mangers.

The accompanying plans are of a combined hopper and mangers (Plates 1-7) for use in the conventional type of wooden dummy bail. Modifications can be made to fit almost any bail of this type.

The hopper is designed with a removable partition, but this partition is only required when two separate mixtures are being fed. When a single concentrate mixture is being used the partition can be dispensed with and the hopper only requires to be filled periodically.

The mangers are quite large enough to contain as much grain as can be consumed during the time it takes to milk the cow. Any additional feed required should be fed in the yards or paddocks.

Feeding Hay or Silage.

Many farmers chaff hay, mostly on the grounds that less wastage occurs when feeding out. Actually, however, cows thrive better on hay than on short chaff, and consequently the extra expense in providing chaff is rarely justified.

Market quotes for lucerne chaff are usually £9 to £10 per ton higher than for similar quality hay, so that even if a little hay is wasted, it is still more profitable to feed. In actual fact, unless hay is of poor quality and unappetising, little is wasted except by soiling and trampling. Trampling can be greatly reduced if hay is fed in racks.

With lucerne hay especially, the leaf, which is the richest portion of the hay, is usually lost when it drops to the ground. Where a suitable tray is constructed under the hay rack, most loose leaf falls into this as the animal draws the hay out through the

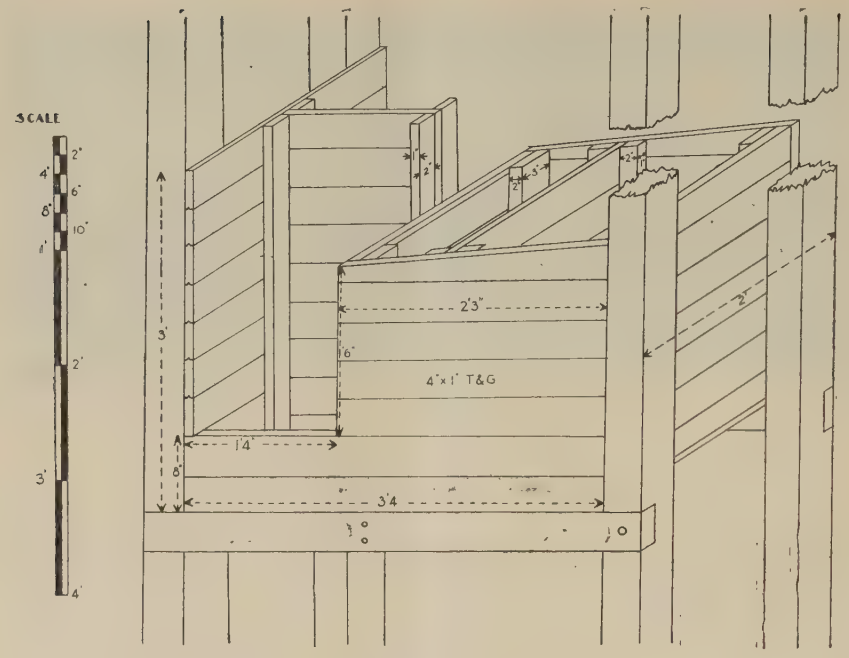

Plate 1.

Side View of Feed Hopper and Mangers in Dummy Bail.

battens, and the leaves can be readily licked up. The same applies when feeding cereal hay containing grain.

The hay rack illustrated in Plates 8-10 is suitable for either loose or baled hay. Dropping the bales into the rack vertically restricts the amount withdrawn at each bite and helps to reduce waste.

Silage can also be fed through this rack, and provided tongue and grooved boards are used in the tray it can also be used for feeding grain.

Being portable, the rack can be moved from time to time if the surroundings become fouled.

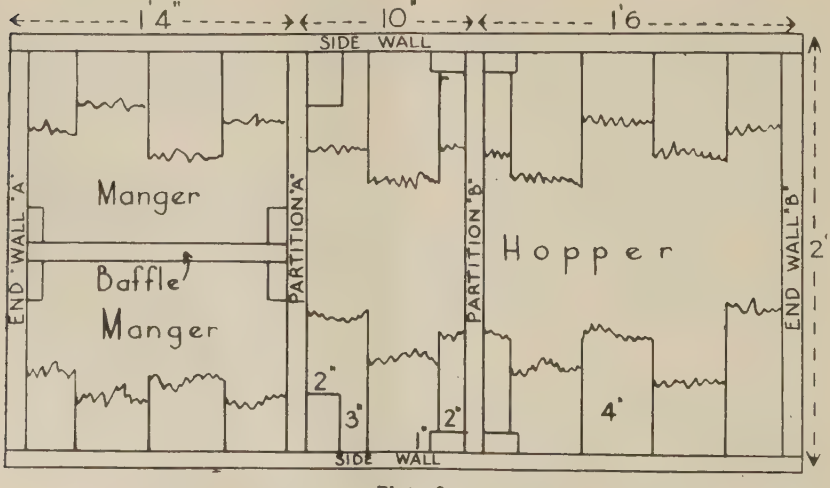

Plate 2.

Ground Plan of Feed Hopper and Mangers in Dummy Bail.

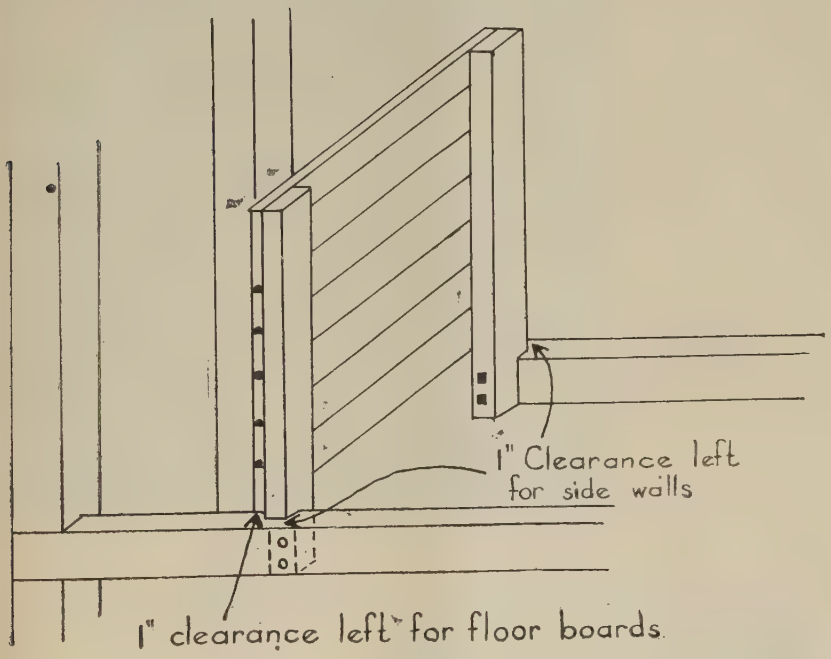

Plate 3.

First Stage of Construction. Build partition "A" (see Plate 2) and bolt it in position.

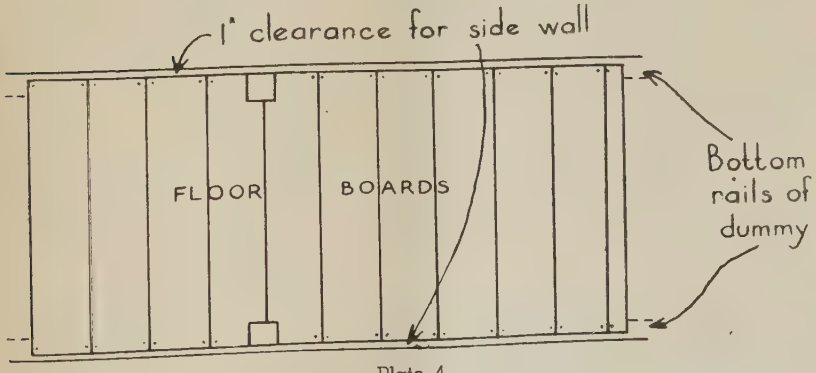

Plate 4.

Second Stage of Construction. Lay down complete floor, remembering to leave an inch on each side for the side walls.

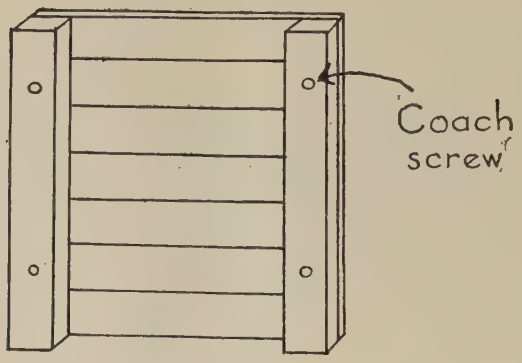

Plate 5.

Third Stage of Construction. Construct end wall "B" and affix it to the posts of the dummy bail with four coach screws. The bottom of end wall "B" rests flush on the floor.

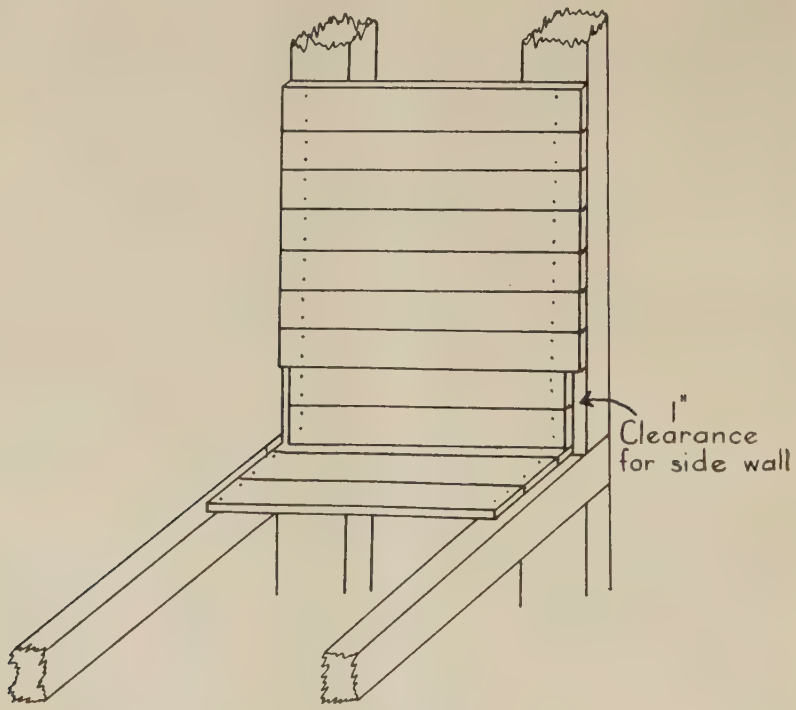

Plate 6.

Fourth Stage of Construction. Nail the tongue and groove boards comprising end wall "A" to the posts of the dummy. The bottom two boards must allow one inch on each side for the side walls.

After this is done proceed as follows:

(1) Nail on the side walls.

(2) Nail strips of 2 x 1 to the side walls at the positions shown, and slide 4 x 1 tongue and groove down to form partition "B".

(3) Construct the baffle in the same way as partition "B".

(4) Construct the lids of 4 x 1 tongue and groove. The lids for the hoppers are hinged on to the posts of the dummy above end wall "B". The lids for the mangers are hinged on to end wall "A".

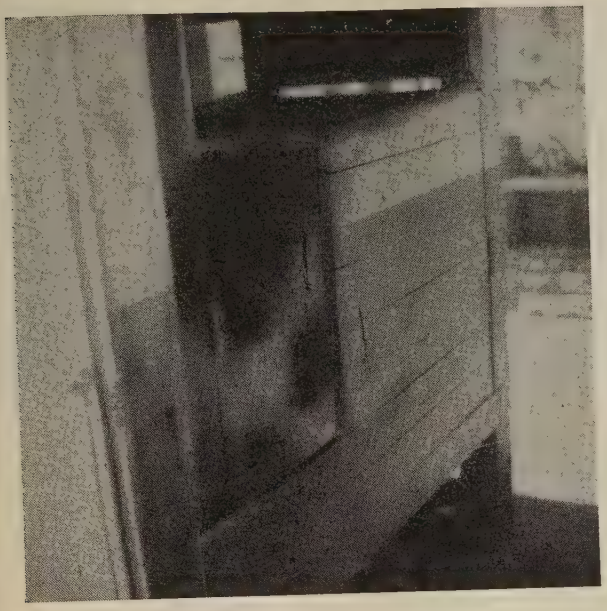

Plate 7.
Photograph Showing Position of Hopper in Dummy Bail.

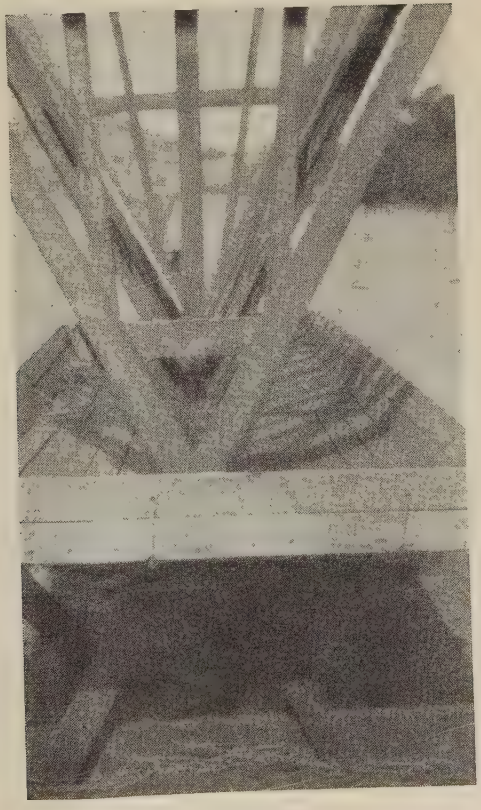

Plate 8.
Photograph of Feeding Rack.

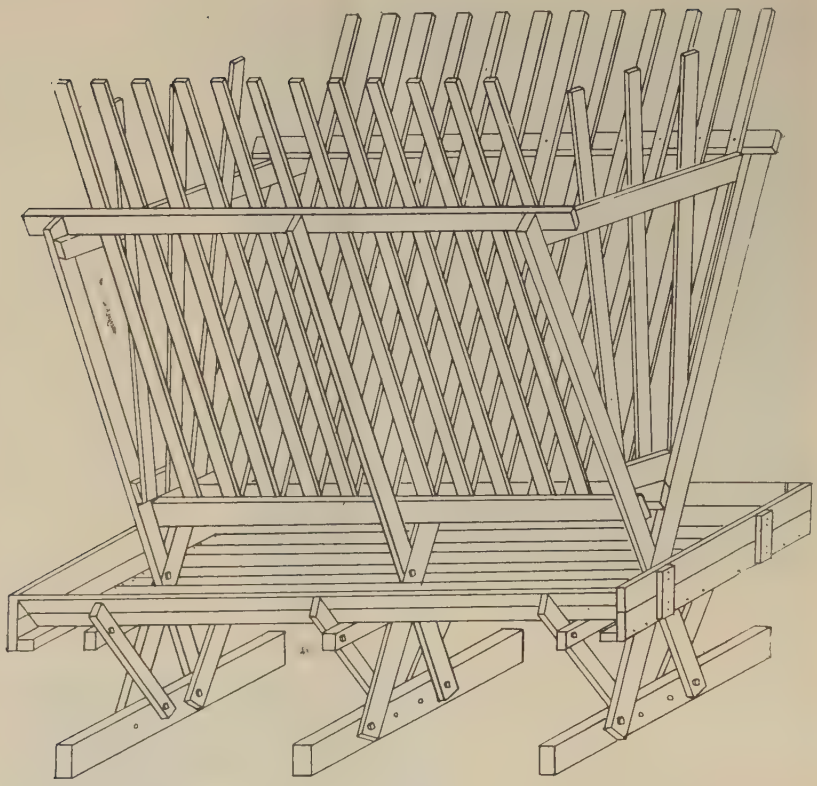

Plate 9.

Sketch of Hay or Silage Rack. Width of base, 4 ft. 2 in. Length of frame (distance between the two end diagonal crosses), 9 ft. Inside measurements of floor of tray, 11 ft. x 3 ft. 4 in. Outside measurements of floor of tray, 11 ft. 3 in. x 4 ft. There are 12 battens (2 x 1) on each side, 6 in. part. The tray projects 1 ft. each end beyond the end diagonal crosses.

Plate 10.

Feeding Rack Used as a Portable Unit.

Group Herd Recording Scheme Rules.

Rule 1. Definitions.

(*a*) "The Official Recording Year" means the period commencing on the first day of October in any year and terminating on the thirtieth day of September of the following year.

(*b*) "Herd Recorder" means a herd recorder employed by the Department of Agriculture and Stock.

(*c*) "Grade Cow" means a cow which is not a purebred cow.

(*d*) "The Scheme" means the Herd Production Improvement Scheme.

Rule 2. Herds Eligible for Recording.

Membership in a Herd Recording Group shall be open to any dairy farmer whose farm is situated within the area covered by the Group. Any such person who desires to become a member of the Scheme shall make application on the form provided by the Department of Agriculture and Stock and shall agree to pay to the Department of Agriculture and Stock the fees specified in the Schedule hereto; provided that, if the applicant supplies his primary product to a factory, he may furnish to the Department an order directing the Manager of the Factory to which he supplies his primary product to deduct from the proceeds of sale of same the amounts due and to pay them to the Accountant of the Department of Agriculture and Stock.

Rule 3. When a Member Discontinues Recording.

If a member discontinues recording at any time, he shall nevertheless be liable to pay the full amount of the fees chargeable for each cow in his herd for the balance of the period for which he has agreed to submit his herd for recording. Notwithstanding anything to the contrary, however, the Department of Agriculture and Stock may, on application, and in its discretion, waive the payment of fees where it is satisfied that special circumstances exist which warrant the granting of such a concession.

Rule 4. Information to be Supplied.

Every member of the Scheme shall agree to supply and will supply all information required in respect of each individual cow in the herd. He shall also supply information in respect of any surveys conducted into aspects of the dairying industry by the Department of Agriculture and Stock.

Rule 5. Period of Membership.

Every applicant shall agree to become a member of the Scheme for at least *two* official recording years and during that period to submit his cows for testing and pay the fees in accordance with these Rules.

Rule 6. Cows Eligible for Recording.

Every member of the Scheme shall agree to submit and shall submit for recording every cow in his herd whether it or they are milked once or twice daily. Cows shall be classified at the commencement of recording as follows:—

(*a*) A Class cow.

(*b*) B Class cow.

The following cows may, with approval of the Director of Dairying, be classified as "B" Class. All other cows will be classified as "A" Class.

(1) Cows which have aborted.

(2) Sick Cows: Any such cow automatically becomes "A" Class if it produces 75 lb. of butterfat for the first six months of its lactation period.

(3) Strippers: In herds entering test for the first time, a stripper is defined as a cow which has calved more than 120 days prior to the first recording date.

(4) Nominated cows: A nominated cow is one which has calved normally, but which, on entry to recording, is nominated for culling. The reason for culling must be given. If any such cow is not disposed of at the time of its sixth recording, it will automatically become an "A" Class cow.

Application for cows to be entered as "B" Class must be accompanied by full particulars of these cows and the reasons for application.

The records of "B" Class cows will not be used in calculating annual averages, either for the herd or for the scheme as a whole.

Rule 7. Right to Refuse to Record.

The Department of Agriculture and Stock may refuse to record or to continue to record the herd of any member if, in the opinion of the Director of Dairying, such member has committed any breacb of these Rules, and such member shall nevertheless remain liable for any fees for which he would be liable had such recording been carried out or continued.

Rule 8. Where Samples are to be Tested.

It shall be optional to test the samples on the farm or to send or take them under adequate protection to be tested at some approved centre.

Rule 9. Who Shall be Official Recorders.

The official recorder shall be an officer of, or approved by, the Department of Agriculture and Stock.

Rule 10. Accommodation for Recorders.

Members shall provide sleeping accommodation and meals for the herd recorder during the period he remains on the premises of the member for the purpose of recording the member's cows.

Rule 11. Times of Milking.

Each member shall notify the Department of Agriculture and Stock prior to the commencement of each Official Recording Year the times at which the member proposes to commence his milkings. Such times will be regarded as the schedule milking hours of the member, and shall not be altered unless at least four days' prior notice of the proposed alteration is given to the Department of Agriculture and Stock.

Rule 12. Assistance for Recorder.

Members must render every possible assistance to the Recording Officer, and give true and complete particulars required by the Department of Agriculture and Stock to enable the Recording Officer to carry out his duties for the purpose of procuring true and reliable returns. The Recording Officer must be given reasonable facilities to keep the cows and milking in sight and to carry out adequate supervision during the whole of the milking operation.

Rule 13. Liability for Damages.

No person who has at any time been a member of the Scheme shall have any claim for damages of any nature whatsoever against Her Majesty the Queen, the Government or any officer or employee of the Government for anything done or omitted to be done in connection with the Scheme and the recording of any cow.

Rule 14. Decision on Rules.

In all matters relating to herd recording, the decision of the Director of Dairying shall be final.

Rule 15. Records to be Forwarded to Head Office.

The Herd Recorder shall forward to Head Office, Division of Dairying, a copy of the results of each herd recorded, and shall leave a copy with the farmer. The computations on each herd record sheet will be checked in Head Office and entered on statements for recording the production of each individual cow.

Rule 16. Cows to be Numbered.

All cows for record purposes will be known by their numbers. Under no circumstances shall the same name be used for more than one cow during any recording period. Cows may not be substituted for the number or numbers of any which are dry, dead or have been culled during the same recording year.

Rule 17. Dry Cows.

When cows are reported dry after being recorded for portion of the recording year, the word "recorded" should be entered opposite the name and number in addition to "dry."

Rule 18. Identification of Cows.

The following means may be adopted to identify each cow under test—

(*a*) A list of all cows in the herd shall be placed in each milking shed showing each cow's name, recording number and brief description.

(*b*) A fire or acid brand, consisting of numerals, may be imprinted under the registered three-piece brand.

(*c*) The member shall keep an approved herd register and such other records as are necessary for the recording officer to obtain the required information as to age, calving and service and drying-off dates, sire, dam and reasons for disposals. Such information shall be made available to the herd recorder.

Rule 19. Lactation Period.

The official lactation period shall be 300 days. Where cows exceed 300 days' lactation period, only the production record for the first 300 days will be used in compiling herd averages.

Rule 20. Daily Weighing and Sampling.

(*a*) *Weighing.* In recording each cow, the recorder shall weigh, on officially approved scales, the milk yield at each of two consecutive milkings and record same. The weight of milk for each milking shall be taken to the nearest half-pound.

(*b*) *Sampling.* After weighing the milk from each cow, such milk shall be thoroughly mixed and the recorder shall take a sample. A composite sample shall be taken of the two milkings. The composite sample shall be made up of aliquot parts taken by means of factors according to weights of milk.

Rule 21. Computation of Production Records.

The yield for the lactation period shall be calculated as follows:—

(*a*) The lactation period shall consist, in the case of the 300 days' record, of 10 sub-periods each of 30 days. In the case of cows not completing in full the required number of sub-periods, the lactation shall be concluded with the sub-period of the last recording.

(*b*) The cows shall be recorded once in each sub-period at approximately equal intervals of time. The recordings shall be carried out as far as possible at intervals of 30 days. In the event of it not being possible to do so, the recordings may be carried out not more than 35 days and not less than 25 days after the preceding recording, and, if this is not practicable, the calculations for the sub-period under record will be averaged as in the case of an abnormal recording.

(*c*) The yield for each sub-period shall be calculated as follows:—

(1) The milk yield shall be the amount (lb.) of milk yielded over the 24 hours' recording period multiplied by 30.

(2) The butterfat yield shall be the amount of butterfat (lb.) calculated from the weight (lb.) and butterfat percentage of the same 24 hours' milk yield multiplied by 30.

(*d*) The yields for the lactation period shall be the sum of each sub-period.

Rule 22. Check Tests.

(*a*) The check test may be made at any time on any herd or any cow. No prior notice of such check test shall be given to the owner.

(*b*) The results of any check test or tests may, at the discretion of the Director of Dairying, be made available to the herd owner.

(*c*) The check test results shall not be used for the purpose of calculating sub-period production except when in special circumstances it is considered advisable by the Director of Dairying to substitute the check test results for the ordinary sub-period test results. When the check tests results are so substituted, the whole of the check test or tests shall be used and no cow shall be credited with production based on the ordinary sub-period test results.

Rule 23. Cows First Recorded more than 44 days After Calving.

When the first recording of a cow is made between 45 and 120 days after calving, such cow will be credited with milk and butterfat production as shown hereunder.

No. of days elapsing between calving and first test.	Period of production credited on first test.	No. of records required for 300 days lactation period.	Method of arriving at the tenth sub-period.
45–74	60	9	Treat the 9th recording as 10th sub-period
75–120	90	8	Treat the 8th recording as 10th sub-period

Rule 24. Compiling Record when Calving Date is Unknown.

When a herd is first submitted for recording and the date of calving of any cow is unknown, a record of her production will be compiled provided she has been recorded for at least 8 sub-periods. The record will be marked as "Estimated—No Calving Date Available."

Rule 25. Incomplete Lactation Records.

When an "A" Class cow is sold or culled or has died, a record of her lactation will be compiled provided she has been recorded for at least 8 sub-periods. The record shall be marked as "incomplete" but will be used in compiling annual herd summaries.

Rule 26. Averaging Abnormal Records.

In the case of a cow appearing to be sick or recording abnormally (i.e., more than 25 per cent. above or below the average of the proximate and succeeding recordings), such recordings may not be registered, but an average may be made from the proximate and succeeding recordings. Any such sickness shall be reported on the Herd Record Sheet by the recorder. The same course shall also be followed in the case of a cow whose sample is, or has become, unavailable for correct testing.

Where the first recording is abnormal, or the sample is or has become unavailable, the yield for the first sub-period shall be taken as the same as the yield recorded for the second sub-period.

Where the last recording is abnormal, or the period between the last recording and the date on which the cow is marked "dry" is more than 35 days, the yield for the last sub-period shall be calculated by taking nine-tenths of the record for the preceding sub-period.

Rule 27. Use of a Production-Backed Bull.

Each member of a Group undertakes that, within three years from entering his herd for recording, he shall own a purebred bull *ex* a cow which has achieved the age standard for production prescribed by the rules of the Purebred Production Recording Scheme.

Rule 28. Recording of Purebred Cows.

Where a member records registered purebred cows under the Group Herd Recording Scheme conditions, such registered purebred cows shall be regarded as grade cows for the purpose of assessment of charges.

Where a member proposes to submit cows for recording under both the Purebred Production Recording Scheme and the Group Herd Recording Scheme, he shall pay the fees appropriate to each Scheme.

Schedule of Fees.

The fee for "A" class cows is 7s. 6d. per cow per lactation.

Fees are payable when a cow has been submitted for her first test.

No fee is payable for "B" class cows.

RECENT ADVISORY LEAFLETS.

The following are among recently issued advisory leaflets available free to Queensland primary producers:—

Cotton Growing in Queensland.
Hints on Hive Making.
Sowing Summer Pastures on the Darling Downs.
The Case for the Mules Operation.
Fat Lamb Production in Queensland.
Lantana Poisoning of Stock.
Milk and Cream Production in Summer.

Dairying in Denmark.

By L. E. NICHOLS, Dairy Research Branch.

Agriculture has been Denmark's main industry throughout the centuries. It has a land area of 16,500 square miles, of which 78% is used for agriculture only. There are cattle on virtually all of the 208,000 Danish farms, whilst the average farm size is 40 acres. About 25% of the population of over 4 millions are engaged in agriculture.

The soil is very intensively cultivated on the rotation system, the most important crops being cereals 41%, roots 19%, and grass approximately 34%. Yields per acre are high compared with those of other countries.

Cattle are the mainstay of Danish agriculture, and the land is heavily stocked to produce butter and cheese of the highest quality, largely for export, which constitutes an important part of Denmark's economy. Bacon and eggs are also important livestock products.

DAIRYING.

The dairying industry is highly specialised, with excellent factory buildings and equipment, despite the large number of small factories. High production and high quality is the keynote of the industry's widely diversified dairy production.

The progress of Danish dairying is due to the efforts of the industry itself and the growth of the co-operative movement. Herd recording, quality control, farm and factory instruction, payment on quality, and disciplinary action for failing to meet desired standards of quality are administered by the dairying industry. Such efforts are a tribute to an industry which is 99% co-operative. On the other hand, dairy education and research in dairying, which are well provided for, are functions performed by the State.

Plate 1.

A Progeny Testing Show in Denmark. A progeny group from one bull is lined up.

The dominating importance of quality is appreciated and it can be claimed that no country surpasses Denmark in terms of butterfat production per cow. Milk yield per cow in Holland slightly exceeds that in Denmark, but average test and total butterfat are higher in Denmark. Overall milk production is greater than that of Queensland from a similar cow population, but vast differences in climate and pastures are the main contributing factors. The cooler climate with its reliable rainfall and a dominance of clover-ryegrass pastures favour both production and quality.

DAIRY FARMING.

Dairy farming practices in Denmark are recognised as among the best in the world. Dairy cattle number 1,500,000 and are of a high standard of quality. There are approximately 190,000 herds, and the usual number of cows per farm is about 10. Milk production per cow averages 816 gallons, with an average test of 4.1%. Average butterfat production is 332 lb., or the equivalent of 372 lb. of commercial butter. Obviously, smaller farms, fewer but better-fed cows per farm, and more intensive farming practices have made such production figures possible as compared with most dairying districts of the Commonwealth, with their larger farms and more pastoral dairying practices.

ARTIFICIAL INSEMINATION.

Small herds in closely settled areas have encouraged the rapid development of artificial insemination, and the remarkable extent to which the practice has been adopted will further improve Danish cattle stocks. Already 75% of the dairy herds are artificially inseminated. Each A.I. station serves approximately 25,000 cows and 70% success is obtained on the first insemination. The cost is about £1 per cow. It has also been shown that it is cheaper for the small farmer to use A.I. for his cows and replace the bull by a high-producing cow.

The health of Denmark's cattle is very satisfactory. The complete eradication of tuberculosis and the campaign against brucellosis are examples of what can be achieved by good co-operation. As a result of the 5-year plan for the eradication of bovine tuberculosis from dairy herds, Denmark can now claim freedom from the disease—a fact which is advertised on all exported dairy products.

There are four breeds of dairy cattle in Denmark—Red Danes, Black and White Danes, Shorthorn and Jersey. Red Danes are the most widespread and constitute more than two-thirds of all the cattle, as shown below:

Red Danes	67.8%
Black and White Danes	19.2%
Shorthorn	8.1%
Jersey	1.5%
Crossbreeds and others	3.4%

In the breeding, most emphasis is placed on the development of cattle with capacity for high milk yields and a fair percentage of fat and other solids in the milk. However, breeders also aim at breeding cows which the butcher will buy when they are culled; hence the tendency to develop dual-purpose breeds, and particularly large-framed animals.

MILK RECORDING.

Production recording is a fundamental factor in breeding. Over 50% of the cow population is production recorded, most of the cost (up to 9s. per cow) being borne by the farmer himself. However, the main tendency has been an increase in production of milk and butterfat per cow each year.

PROGENY TESTS AND BULL TESTING.

These tests assess both the virility of each bull and its ability to transmit the necessary qualities to its offspring. The results are regarded as decisive factors in selection for breeding. In the progeny tests the yields of the daughters are compared with

those of the mothers, in the corresponding lactation, to ascertain the bull's ability to transmit high production. The yield in 365 feeding days is calculated both for mothers and for daughters. If the daughters give more milk and butterfat than their mothers the increase in yield is credited to the bull. If the daughters give less milk and butterfat than their mothers, the decrease in yield is considered to be the fault of the bull. Examinations are carried out on large collections of progeny from bulls of about five years old. Between 250 and 300 bulls a year are judged at such progeny shows.

However, changed feeding conditions often make comparisons difficult, and so a new form of progeny test, called bull-testing, was developed. The principle in this test is that although the comparison of daughters' yields with the mothers' yields is not possible, it is possible to make the treatment of a selection of daughters from the different bulls uniform year by year.

The tests take place at farms approved as testing stations. The development of bull-testing stations has been a notable achievement. Such stations warrant greater consideration in this country, especially if supported by progeny testing shows. By uniform feeding of up to 20 selected daughters under identical environmental conditions, it is possible to prove the worth of a bull in 12 months, as compared with approximately 7 years under normal conditions, when much of his useful life has passed. Teams of 20 are sent to the stations as first calving heifers a month or two before calving. The milk yields, fat content and food consumption are carefully recorded for 304 days after calving.

There are 28 testing stations in Denmark, with 78 daughter groups for testing. To date 280 daughter groups with more than 5,000 first-calf heifers have been tested. The daughter groups have averaged 1,180 gallons of milk annually. Danish authorities claim a good bull can improve production by as much as 75% in milk and butterfat, as compared with a poor bull.

The results of bull-testing are of especial value where artificial insemination is widely practised. For example, a bull may be used for 10,000 to 12,000 cows in a lifetime, from which 4,000 daughters may be kept for milk production for about 4½ years. There is a great difference between the best and the poorest group of progeny of different bulls. For example—

	Milk lb.	Fat %	Butterfat lb.	4% fat corrected Milk lb.
Best group (Bull A) ..	11,733	4·55	533·7	12,698
Poorest group (Bull B.) ..	6,982	4·22	295·9	7,231
Difference	4,751	..	237·8	5,467

Based on such facts, the daughters of the two bulls would in their lifetime give—

	Million Gallons.
Daughters of Bull A ..	21.1
Daughters of Bull B ..	12.6
Difference	8.5

which at 3s. per gallon would return over £1,000,000 more milk from the daughters of the good bull.

It is also recognised that this form of bull testing enables the true production to be recorded at a very early stage, thus permitting best use to be made of the bull. A further advant-

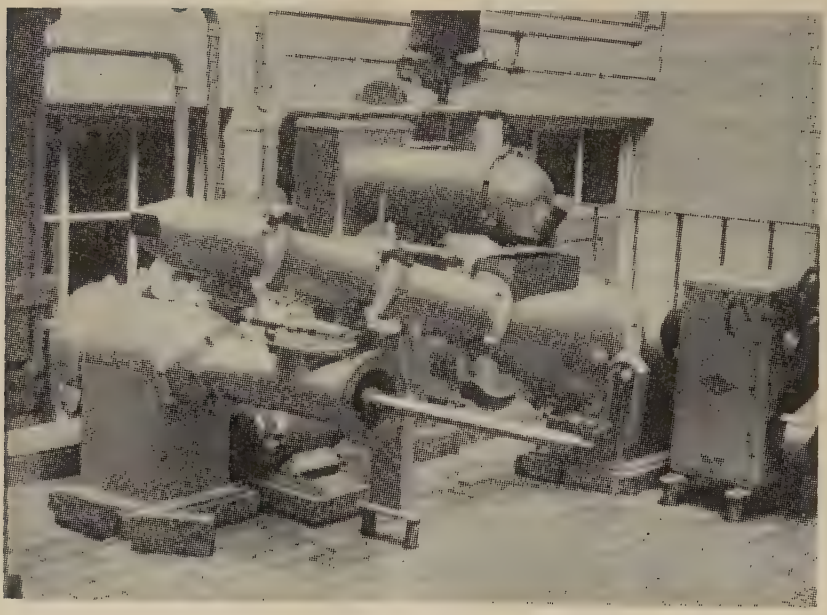

Plate 2.

A Fritz Continuous Buttermaking Machine in Operation in a Danish Factory.

Plate 3.

A Double Conical All-Metal Churn at a Butter Factory.

age of the identical feeding and management at testing stations is the opportunity to compare lactation curves from cow to cow and from group to group.

FEEDING.

Despite developments in the breeding of dairy cattle, most Danish authorities admit that at least 80% of dairy production is due to farm husbandry practices and 20% to the sire.

It has been estimated that with better bred cows, whilst more feed is necessary, the extra milk yield is worth twice the extra cost of feed. Obviously, better feeding must accompany better breeding for increased milk production—a fact some farmers are apt to overlook in this country. Great stress is laid on the feeding of high-quality home-grown roughage, hay and silage, and as much as 50 to 70 lb. of silage per cow per day is fed.

Rations for Danish dairy cows consist of 16-17% concentrates (grain and oilcakes). Obviously, such a high level of concentrate feeding is neither practicable nor economical under average Queensland conditions. Nevertheless, improvement in production could result if more conserved fodder such as hay, silage and grain were fed to Queensland dairy stock.

By recording the quantity of milk and the fat content and feed consumption year after year, milk recording provides the owners of herds with the best possible information on which to select breeding animals. The yield figures also form the basis of correct feeding for the individual cows. The aim in these herds is not the highest possible yields, but first and foremost, sound feeding economy.

The resultant high production of Danish herds has thus been aided by good feeding, good breeding, and herd recording supported by progeny testing and the widespread use of artificial insemination from proven sires.

DAIRY FARMING PRACTICES.

Milk yields on many farms are as high as 1,100 gallons per cow annually. Hay, silage and good quality red and white clover and ryegrass pasture are common on most farms. Grain and concentrates, fodder beet, wheat and oats are also fed. Numerous farmers also grow oil-seed crops such as rape for margarine manufacture.

Although soil fertility may not be as good as in many districts in Queensland, there is nevertheless a general appreciation of the need for returning soil nutrients depleted by dairy cows, etc. Consequently, topdressing of pastures with superphosphate and other fertilizers is standard practice.

Incidentally, where inbreeding has has been practised for many years and high production attained, cross-breeding with Jerseys and Friesians is under consideration. Whilst Red Danish cattle are noted for their milk production, it has been shown that Jerseys consume fewer food units and have given a higher yield per acre.

Separated milk is the basic foodstuff for the country's large pig population. It is mostly fed soured to both pigs and calves.

The majority of herds are machine stripped. Even though Denmark enjoys a comparatively cool climate, farm refrigeration of milk is practised on a number of farms. The chemical sterilization of dairy equipment with use of chlorine solutions is practised. Every effort is made to control flies in the dairy, and the use of modern insecticides supplements hygienic practices in the dairy. In many places, milk is delivered twice daily to the factories.

PAYMENT FOR MILK ON QUALITY.

All milk is paid for on a butterfat basis irrespective of usage. In addition, the methylene blue test for many years has been the legal basis for payment of differentials for hygienic quality. The necessary incentives for high-quality milk production have

Plate 4.

Hydraulic-type Cheese Presses in the Pressing Room of a Danish Dairy Factory.

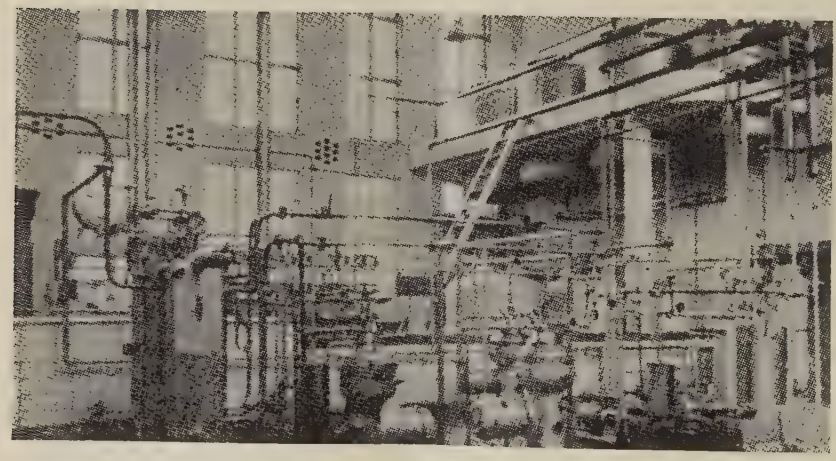

Plate 5.

Pilot Equipment at the Hillerod Dairy Research Institute.

thus been given. A deduction of about a 1d. per gallon for milk is made if below a 4½ and 5½ hour methylene blue test during the summer and winter months respectively. The adoption of similar methods in Queensland generally would help an overall improvement in milk quality.

DAIRY PRODUCTION.

The total annual milk production of Denmark is 1,120 million gallons. Milk is supplied to 1,350 co-operative factories and 250 proprietary factories. It is appreciated that it is difficult for such a large number of small factories to operate as economic units, and already steps are being taken to reduce the number of factories. This development will no doubt save manpower and reduce manufacturing costs.

Butter and cheese manufacture are of most importance. Butter production totals 170,000 tons annually, and cheese production in recent years has increased to 100,000 tons at the expense of butter. Butter is made from cream ripened in the factories by means of a starter. Variable-shaped all-metal rollerless churns have replaced wooden churns. The product is packed in beechwood casks. There are also a number of continuous butter-making machines in operation, but generally on an experimental basis.

Consumption of butter in Denmark is 16 lb. per head, whilst margarine consumption is 32 lb. The Danish people consume considerable quantities of fat because of the cooler climate. Margarine, being the cheaper product, is consumed locally, whilst the higher priced butterfat is exported. The practice thus benefits the national economy.

Particular importance has been attached to the production of fancy cheeses of a high fat content (for example, Danish Blue and Samsoe). Other popular types include Emmental and Camembert. Denmark is especially noted for its blue mould varieties of cheese.

Only the highest quality butter and cheese are approved for export.

Market milk is compulsorily pasteurised and standardised to 3.5% butterfat. Distribution is mainly through shops. School-milk, however, must be certified and is not standardised. Special care is given children's milk, which is treated and bottled separately. Municipal authorities control market milk, and medical inspections of all milk plant employees are made regularly. The plate count for market milk averages 30,000 per ml. Coffee cream with 9% butterfat is also popular and in much demand.

Whilst much stainless steel equipment is used in dairy factories, aluminium equipment is also finding many uses. Incidentally, where stainless steel equipment is installed, in-place chemical cleaning is standard practice.

DAIRY EDUCATION AND RESEARCH.

High-quality production necessitates first class technical equipment and working conditions. Much importance is attached to well-planned dairy factories, good equipment and the training of staff.

Excellent technical and advisory services for farms and factories are provided through the Danish Dairy Association, whilst statutory control of products for export is a function of the Ministry of Agriculture. Dairy factory employees serve a practical apprenticeship of four years. They then have to attend a dairy school, at which certificates of proficiency are awarded for the passing of technical examinations.

The Royal Veterinary and Agricultural College and the State Experimental Dairy at Hillerod are responsible for the scientific work behind Denmark's dairy industry. Dairy education at University level is given at the Royal Veterinary and Agricultural College in Copenhagen under a Professor of Dairying. The 3-year course must be preceded by four years' practical work and one year at a dairy school. The course

covers dairy technology, dairy husbandry, dairy economics, dairy machinery, dairy chemistry and dairy bacteriology. Short courses covering eight months are also available for factory employees.

The State Dairy Research Institute at Hillerod, on which an experimental dairy factory is situated, conducts research work and the testing of dairy machinery. Research work at Hillerod is carried out with the aid of pilot plants. Experimental work covers buttermaking and cheesemaking mainly, and the spray-drying of milk. Chemical, bacteriological and physical problems of dairy products are under investigation, particularly cheese flavour.

At the adjacent Government Experimental Dairy farms research is carried out on the effect of different feeding stuffs on the quality of dairy products.

Denmark has thus given every encouragement to the development of efficient dairying practices as well as providing good facilities for tackling the many practical problems of the dairying industry. It has thus set an example which might well be followed by more dairying countries.

VOL. III. OF THE "QUEENSLAND AGRICULTURAL AND PASTORAL HANDBOOK."

"INSECT PESTS AND DISEASES OF PLANTS."

This book holds a wealth of information on pests and diseases affecting cultivated plants in Queensland. It contains 560 pages and over 300 illustrations.

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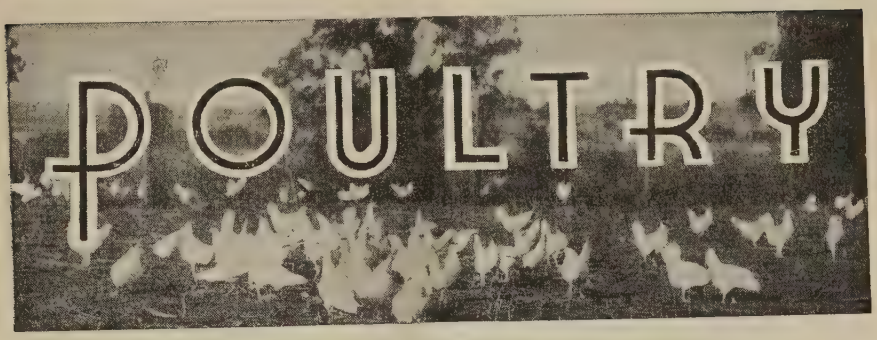

The Stickfast Flea of Poultry.

By B. W. MOFFATT, Assistant Adviser, Poultry Branch.

This pest made its appearance in Queensland in 1941 and was at first confined to the Boonah and old Normanby Shires.

Small outbreaks have been found in recent years at Beaudesert, Gatton, Glenore Grove, Hatton Vale, Forest Hill, Moreton Vale, Kentville, Helidon and Tannymorel, but these infestations have been brought under control by regular treatment of the fowls and breeding grounds of the flea with DDT. A widespread infestation was recently found in the Townsville area, 1,000 miles north of the known flea area.

Recognising the Flea.

It is a small, reddish-brown, blood-sucking flea, not unlike the common dog flea in external appearance but with one distinguishing feature—it attaches itself firmly to its host and remains so attached for the period of its lifetime; hence the name stickfast flea.

The flea is found in clusters on the unfeathered portions of the fowls, such as the face, comb, wattles and throat (Plate 1). Sometimes when the bird is in heavy moult it may be found attached to the skin of the body. On dogs and cats, it is usually found between the toes, on the ears, and on the soft skin of the belly; it may even occur on the short-haired parts of the face. It has also been seen on some domestic farm animals. It can become attached to man; in the Tannymorel area, a flea was found on a baby.

Is it Harmful?

This question must be answered in the affirmative, for its effects are often more serious than the farmer realises. It can cause deaths in chickens and lowered production in hens due to its bloodsucking habit. Although it doesn't cause deaths in layers, do not under-estimate the effect it can have on profitability because of decreased egg production.

How Does it Spread?

Taking into consideration the number of hosts it can attach itself to, it is not hard to imagine how quickly and easily the parasite can be taken from one farm to another or from one district to another. Poultry, because they do not roam any distance from their sheds, are not a serious means of spread unless taken from an infected area to a clean area. In some instances, outbreaks have been due to the movement of known infested animals by people indifferent to the trouble they may cause others.

Dogs and cats are a serious hindrance to the control of the flea, for these animals roam freely, carrying the flea from farm to farm. Many of the outbreaks have been traced to

the introduction of a flea-infested dog, cat or even a broody hen. Whilst dogs, cats and fowls are readily implicated in the spread of the flea, it is also feasible that eggs, larvae and pupa of the flea may be transported on the floors of old crates which have been used for the carriage of infested poultry.

The next step in infested areas is to prevent dogs and cats from straying onto your property.

Life Cycle of the Flea.

Before a programme of preventive treatment can be undertaken, the life cycle of the parasite must be understood.

Plate 1.

Stickfast Flea on the Head of a Fowl.

Keeping the Flea off Your Property.

Armed with knowledge concerning the living places, effect and means of spread of the flea, a plan can be formulated to prevent this parasite from gaining a foothold on your property. The first step is to ban the introduction onto the property of any adult fowls or started stock, dogs, cats or crates from infested areas.

The female adult flea, whilst attached firmly to its host, ejects 1 to 4 eggs in 24 hours onto the ground or litter on the floor of the pen, where they hatch in 4-6 days under favourable conditions of moisture and temperature. The eggs are usually laid at night whilst the host is resting. The larva that subsequently hatches from the egg spends 2-3 weeks under the surface of the soil or litter before it pupates. The young flea emerges

from the pupa in approximately two weeks and attaches itself to the fowl.

Under unfavourable conditions, the life cycle may extend over a period of months.

Treating Stickfast Flea.

Experimentation and field observation have proved that water-dispersible DDT is a very effective insecticide for the eradication of the flea. Treatment should be commenced immediately the parasite is noticed and carried out regularly at monthly intervals until the flea is eradicated. Even then, further treatments at intervals of two months should be given in order to protect the birds from re-infestation due to delayed development of the larvae.

The most suitable commercial DDT preparation to use is one containing 50% *pp'*DDT, which when melted and mixed with water will form a fine and stable suspension. Two gallons of water containing 3¼ oz. of the 50% preparation gives a 1% DDT suspension, which is the recommended treatment. All fowls should be wholly immersed in this dip and the feathers and skin thoroughly wetted by agitation.

Dogs can be safely washed in this solution. Because of their licking habit, cats may suffer from DDT poisoning if washed in a DDT solution. They should be treated by smearing the infested parts of their bodies with castor oil, neatsfoot oil or white spraying oil as used by horticulturists.

DDT emulsions with a kerosene or oil base must not be used on poultry or animals for two reasons: firstly, kerosene scalds; and secondly, oil will facilitate the absorption of DDT through the skin and cause DDT poisoning.

DDT, apart from its excellent flea-killing power, has the added benefit of keeping the fowl free from flea for a period of approximately 7-11 weeks due to its residual effect. On the other hand, if oil is used it is necessary to apply it as frequently as fleas become attached.

Attempts have been made to eradicate the flea by spraying likely areas of infestation with DDT. Spraying has its limitations, because (1) the larvae live beneath the surface of the soil and only a relatively small percentage would be affected by the spray; (2) often the area to be sprayed is too big; and (3) infestation frequently occurs in inaccessible places.

Recently, an officer of the Department treated a bitch infested with the flea with DDT. A month later, he returned to the farm for the next treatment and discovered that the bitch had produced a litter of pups a fortnight previously. The pups had been born under a lowset house and had not moved from there. When the pups were enticed out, they were found to be covered from head to tail with the stickfast flea, although the mother was still free. However, small areas, such as around a dog's kennel, could be subjected to spraying in an effort to reduce the flea population.

The main treatment should be based on the fact that although the fowls and dogs will continue to pick up fleas from the breeding grounds, the residual effect of DDT will cause a complete kill. The use of cement floors and regular cleaning of pens will be of assistance in controlling the flea where fowls are kept on the intensive system. Where cats are not household pets, their destruction will simplify the eradication programme.

Dairy Extension Advisory Committees.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) announced recently that the Government has agreed to the establishment of a Central Dairy Extension Advisory Committee for the purpose of promoting closer collaboration between dairying industry organisations and the Department of Agriculture and Stock. The Chairman of the Committee will be the Under Secretary of the Department (Mr. A. F. Bell), and members will represent the Queensland Dairymen's Organisation, the Queensland Co-operative Dairy Companies' Association, the Queensland Cheese Manufacturers Co-operative Association, the Council of Agriculture, and the Department. This proposal has stemmed from a resolution of the Queensland Council of Agriculture, urging the setting up of district primary industry committees somewhat along the lines of the County Agricultural Committees of the United Kingdom.

This central committee has arranged for the creation of three district advisory committees as an experiment to explore the possibilities of the proposal and to report progress after 12 months, with the objective of extending the principle to other dairying districts in Queensland. These local committees will be centred at Oakey, Gympie and Atherton. Each local committee will consist of three nominees of the Queensland Dairymen's Organisation and three Departmental officers.

Farmers who are recognised as successful and progressive within their district, and who are willing to place their store of knowledge and experience at the service of fellow producers, have agreed to act on the local committees. The committees will act purely in an advisory capacity with a view to assisting any farmer who may voluntarily desire to avail himself of the knowledge and experience of members of the committees in respect of both managerial and technical problems.

Mr. Collins gave the following outline of the aims, functions and method of procedure of the local committees.

1. The primary function of a Dairy Extension Advisory Committee is to work in co-operation with the Departmental Extension Services towards securing the adoption by farmers of recommended farming practices, particularly those practices proved by other farmers under similar conditions of soil and climate—in the same district for preference.

2. The Committee will make an examination of farming methods being followed in its district, with the view to making recommendations as to practices proven by experience as being most suitable within the area and contributing to more economic production; aspects to receive consideration will include fodder conservation, pastures and crops, sub-division of paddocks, water supplies and irrigation, and soil conservation. The Committee's recommendations are to be suitably publicised for the general information of district farmers.

3. Farmers will be invited to avail themselves of the services and advice of the Committee; and should finance be the stumbling block to the adoption of practices recommended by the Committee, the Committee is willing to offer its services in a confidential capacity to either dairymen or bank managers who may desire the Committee to examine specific proposals. In this respect, the Committee may, after examining the facts, present to the Bank a report concerning the project planned.

4. The Committee is to have authority from the Q.D.O. to make local arrangements for full co-operation between the Q.D.O. and Departmental officers in respect to field days, lectures and other efforts to interest farmers towards securing a betterment in net farm income. The Committee will not seek to disturb the system at present operating in this regard as between Branches and Departmental officers; the Committee will be responsible for Q.D.O. co-operation where the project in mind extends beyond one Branch.

5. The Committee may be granted assistance from other Departmental officers where this is desirable, and it can be so arranged with the Department; the services of other persons whether actually dairymen or not may be accepted by the Committee on a voluntary basis.

Breeds of Pigs.

By F. BOSTOCK, Officer in Charge, Pig Branch.

THE BERKSHIRE.

Introduced in the very early days of Australian settlement and maintained as a pure breed by careful breeding and regular importations of unrelated blood lines, the Berkshire is distributed throughout the Commonwealth and occupies a prominent place in the list of breeds approved for use in this State for the production of pork and bacon pigs for both local and export markets.

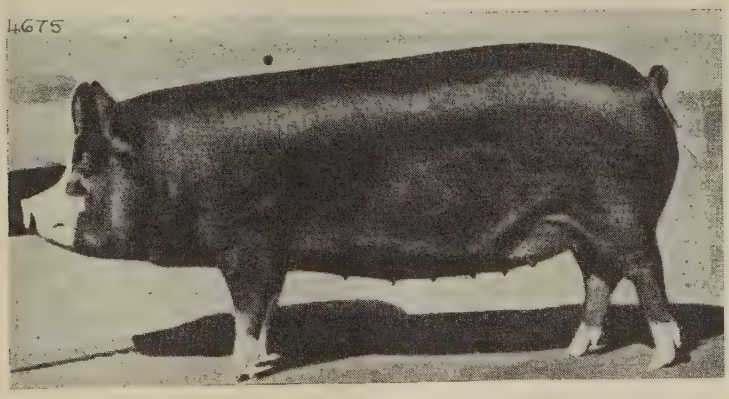

Plate 1.
Berkshire Sow.

The original home of the breed was in Berkshire, England. The colour was black, with splashes of white over the body. Some early records refer to the colour as brownish red, but the colour as known today is black with white points—a white splash on the face, four white feet and a white tip on the tail.

The breed has a long and distinguished history and has earned a high reputation for its evenness of lean and fat and absence of waste. The animals are quick growing and with proper handling and feeding can be satisfactorily finished for market as either porkers or baconers.

The boars are active and reliable workers, while the sows are good milkers and good mothers if kept in reasonable breeding condition.

In comparatively recent years, Canadian-type Berkshires have been introduced and they are now widely distributed. Care should be taken in selection of breeding stock within the Berkshire breed, for as the Canadian increases its popularity, the tendency is to classify all Berkshires as Canadian. However, breeders of British Berkshires have also aimed at increasing body length and fleshiness, so that a fusion of British and Canadian strains is now giving excellent results.

The Australian Pig Society does not recognise the prefix "Canadian" and all pigs of this breed are entered in the Herd Book as Berkshires.

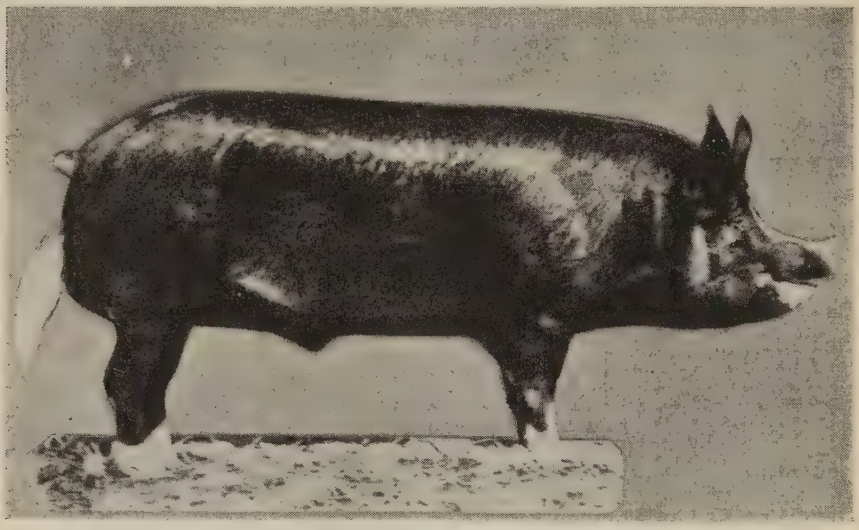

Plate 2.
Berkshire Boar.

Standard of Excellence.

Colour, Skin and Hair.

Colour.—Black, with white on face, feet and tip of tail.

Skin.—Fine and free from wrinkles.

Hair.—Fine, abundant, and free from curls and roses.

Head.

Head.—Moderately short, face slightly dished, snout broad, wide between eyes and between ears.

Ears.—Fairly large, carried erect or slightly inclined forward.

Jowl.—Light.

Neck and Shoulders.

Neck.—Medium length and evenly set on shoulders, deep to chest.

Chest.—Wide and moderately deep.

Shoulders.—Fine, free from coarseness or wrinkles, in alignment with sides as seen from the front.

Back and Sides.

Back.—Long, level and slightly arched, ribs well sprung.

Loin.—Full and broad.

Sides.—Long, level, deep, free from wrinkles and full to flank.

Belly.

Belly.—Underline straight, with 10 or more sound teats evenly placed and starting well forward.

Hams.

Rump.—Wide and well-shaped back to tail setting.

Hams.—Broad, full and deep to hocks.

Tail.—Set high, long but not coarse, with tassel of fine hair.

Legs and Feet.

Legs.—Straight, set wide apart, level with outside of body, flat and with fine bone.

Pasterns.—Strong and as straight as possible.

Feet.—Strong and neat.

General Appearance.

Character.—A combination of all points, showing distinction in breeding, type and quality. In action, walk to be firm and free.

Note.—Boars should be masculine in appearance, with testicles evenly and well attached. Sows should be feminine in appearance.

THE LARGE WHITE.

The Large White, formerly known as the Large Yorkshire, originated in Yorkshire, England, and is one of the best known of the British breeds. For many years, particularly in Australia, it appeared to lose favour, but in recent years has gained world-wide popularity and has proved its adaptability and suitability to such an extent that it is represented in official herd books by a greater number of registrations than any other breed.

It is to the credit of the Large White that it has frequently been successful in winning bacon pig and bacon carcase contests throughout the world. It is excellent for bacon production, more particularly when crossed with earlier-maturing types, and is recommended by curers and butchers, especially by those who are more conversant with the virtues of this type and its crosses with other breeds.

The Large White is noted for its prolificacy and prepotency. These factors should be borne in mind when selecting stock of this breed, as litters of up to 16 are not uncommon and it is necessary to select sows with a minimum of 12 sound teats, more for preference. Likewise, select stock with good conformation, especially when cross-breeding or grading-up is to be practised.

The boars are active and reliable workers, while the sows are tractable, have good milking properties and are good mothers when given reasonable care and attention.

Standard of Excellence.

Colour, Skin and Hair.

Colour.—Hair and skin white, free from black hair, and as far as possible free from blue spots on skin.

Skin.—Fine and free from wrinkles.

Hair.—Straight, fine, abundant, and free from curls and roses.

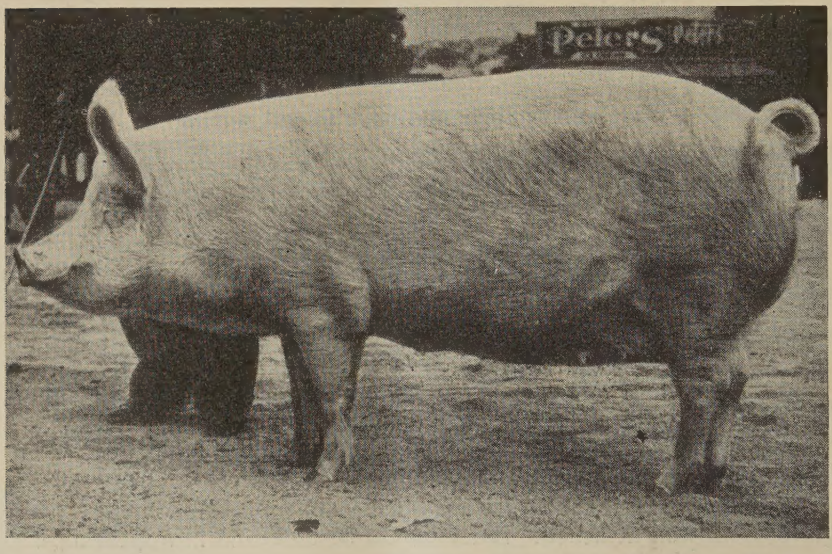

Plate 3.
Large White Sow.

Head.

Head.—Moderately long, face slightly dished, wide between the eyes and between ears.

Ears.—Long, thin, slightly inclined forward.

Jowl.—Light.

Neck and Shoulders.

Neck.—Moderately long, fine, evenly set on shoulders and deep to chest.

Chest.—Wide and deep.

Shoulders.—Level, free from coarseness, in alignment with sides as seen from the front.

Back and Sides.

Back.—Long, slightly arched and wide from neck to rump.

Loin.—Full and broad.

Ribs.—Well sprung.

Sides.—Long, level, deep and well let down to flank.

Belly.

Belly.—Underline straight, with 12 or more sound teats evenly placed and starting well forward.

Hams.

Rump.—Wide and well shaped back to tail setting.

Hams.—Broad, full, and deep to hocks.

Tail.—Set high, stout and long but not coarse, with tassel of fine hair.

Legs and Feet.

Legs.—Straight, set wide apart, level with outside of body, flat and fine in bone.

Pasterns.—Strong and straight as possible.

Feet.—Strong and neat.

General Appearance.

Character.—A combination of all points, showing distinction in breeding, type and quality. In action, walk to be firm and free.

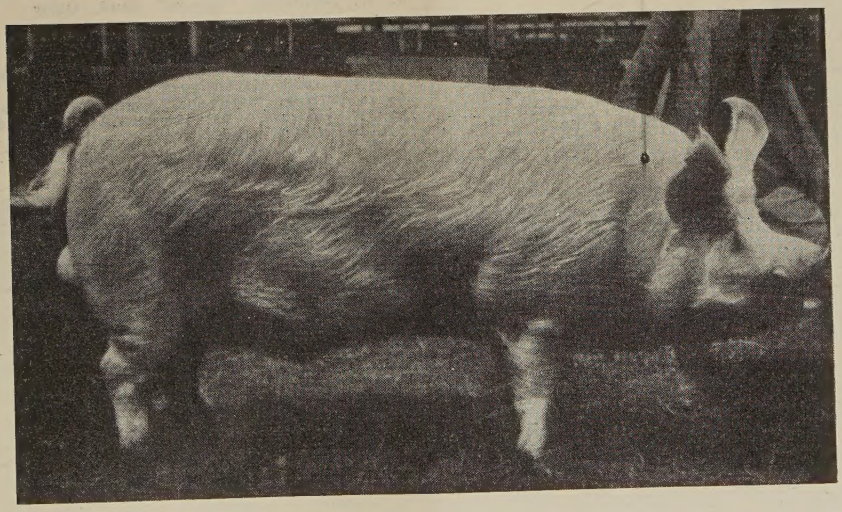

Plate 4.
Large White Boar.

(TO BE CONTINUED)

CASTRATING PIGS.

An illustrated pamphlet dealing with the castration of pigs is available to farmers free of charge on application to district officers of the Pig Branch or to the Head Office of the Department in Brisbane.

Brucellosis-Tested Swine Herds (As at 22nd September, 1955)

Berkshire.

A. P. and N. Beatty, "Deepdene," Barambah road, Nanango
S. Cochrane, "Stanroy" Stud, Felton
G. Handley, "Handleigh" Stud, Murphy's Creek
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
M. K. Collins, "Kennington" Stud, Underwood road, Eight Mile Plains
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
J. H. N. Stoodley, "Stoodville," Ormiston
H.M. State Farm, Numinbah
V. G. M. and A. G. Brown, "Burdell," Goovigen
N. F. Cooper, Maidenwell
R. H. Coller, Tallegalla, *via* Rosewood
E. J. Clarke, "Kaloon" Stud, Templin
M. G. and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
W. F. Ruhle, "Felbrie" Stud, Kalbar
L. Puschmann, "Tayfeld" Stud, Taylor
Dr. B. J. Butcher and A. J. Parnwell, "Hartley Grange" Stud, 684 Logan Road, Greenslopes
C. E. Edwards, "Spring Valley" Stud, Kingaroy
G. McLennan, "Murcott" Stud, Willowvale
H. M. Wyatte, "Deepwater" Stud, Rocky Creek, Yarraman
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
R. J. Webber, "Webberberry" Stud, 35 Caxton st., Petrie Terrace
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
The Marsden Home for Boys, Kallangur
M. F. Callaghan, Lower Mount Walker, via Rosewood
J. B. Lotz, M.S. 794, Kalbar
G. J. Hutton, Woodford
E. R. Kimber, Coalstoun Lakes
K. B. Jones, "Cefn" Stud, Pilton
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
L. Pick, Mulgeldie
J. W. Bukowski, "Secreto" Stud, Oxley

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
K. B. Jones, "Cefn" Stud, Pilton
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
K. A. Hancock, "Laurestonvale" Stud, Murgon
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
G. J. Hutton, Woodford
H. L. Larsen, "Oakway," Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. I. Skyring, "Bellwood" Stud, *via* Pomona
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
F. K. Wright, Narangba, N. C. Line
O. B. Vidler, Manneum, Kingaroy
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
Kruger and Sons, "Greyhurst," Goombungee
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri

Tamworth.

S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
A. J. Surman, "Namrus" Stud, Noble road, Goodna
Department of Agriculture and Stock, Regional Experiment Station, Kairi
E. C. Phillips, "Sunny View," M.S. 90, Kingaroy
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
L. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
H.M. State Farm, Numinbah more, *via* Murgon
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. H. Sattler, Landsborough
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
Q.A.H.S. and College, Lawes
R. H. Coller, Tallegalla, *via* Rosewood
A. J. Potter, "Woodlands," Inglewood
P. V. Campbell, "Lawn Hill," Lamington

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
J. Gleeson, "Iona Vale" Stud, Kuraby
C. R. Smith, "Belton Park" Stud, Nara
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trout road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
F. K. Wright, Narangba, N. C. Line
R. A. Collings, "Rutholme" Stud, Waterford
W. R. Dean, "Trelawn," Tandur, *via* Gympie
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
Mrs. R. A. Melville, "Wattledale Stud," Beenleigh road, Sunnybank
A. J. Stewart, "Springbrook," Pie Creek road, Gympie
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur
A. J. Hicks, M.S. 98, Darlington, *via* Beaudesert
Kruger and Sons, "Greyhurst," Goombungee

British Large Black.

H. W. Naumann, "Parkdale" Stud, Kalbar